FLORA AND VEGETATION OF KALAMAZOO COUNTY, MICHIGAN

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Perennial lupine, *Lupinus perennis,* in remnant oak savanna along a railroad right-of-way in Portage Township, Kalamazoo County, Michigan.

CONTENTS

PURPOSE

This paper is intended to facilitate further study of the flora of Kalamazoo County by providing locally relevant data describing the habitat, distribution, abundance, and current status of native and introduced vascular plant species reported outside of cultivation in Kalamazoo County. I have used the Haneses' (1947) flora as a *vade mecum* of sorts, against which I have compared many of my observations in order to demonstrate how the flora has changed, and to help highlight the imminent conservation concerns that must be addressed to help maintain the ecological integrity (not persistence) of the native flora of Kalamazoo County and beyond. I have focused my efforts on native plants and plant communities that are now rare and/or poorly known in Kalamazoo County, because under current conditions many of those that persist will soon disappear.

PREFACE

Preparation of this flora started in the fall of 1994 while I was a sophomore undergraduate at Western Michigan University (WMU). I started with the intention of ascertaining the status of a handful of rare or otherwise interesting plants, especially orchids and carnivores, reported from Kalamazoo County by the Haneses (1947), but not since fully accounted for. The Haneses' (1947) flora of Kalamazoo County, and the (then) two volumes of the Michigan Flora (Voss 1985; 1972) became my constant companions in the field.

Over time, my interests and ambition grew to include prairie and savanna plants, and my field notebooks began to overflow with data and observations gathered during informal studies of the prairie and savanna flora of Kalamazoo County and beyond, the flora of the Sugarloaf Lakes region, a study of fen and bog floras, and so on. Eventually, in the interest of communicating my observations, and addressing what I saw as pressing conservation issues in the region, I embarked upon developing a checklist of the flora of Kalamazoo County, focusing especially on rare and otherwise noteworthy elements of the flora. By this time I was entering my final (fourth) year at WMU.

While considering offers for fall enrollment in graduate school I was offered a position at WMU co-teaching the field portion of plant taxonomy while Dr. Richard W. Pippen (the usual instructor) was away for the semester. At this time, Mike Penskar (Botanist, Michigan Natural Features Inventory (MNFI)) expressed interest in hiring me as an intern to help update the MNFI element occurrence (EO) records for rare or otherwise noteworthy plants, especially from SW Michigan. After considerable thought I decided to postpone graduate school for a semester and to further pursue my interests in the local flora and completion of the checklist while teaching plant taxonomy and interning at MNFI.

My slowly growing checklist of the flora of Kalamazoo County would turn out to be just the start however, as over the next few years, I gathered much additional data, especially from the remnant prairie, savanna, and wetland plant communities of Kalamazoo County, and I decided to expand the checklist to include an introduction, annotations for each species, and an overview of plant communities. Additional data were gathered from herbarium specimens, the notes and 1947 flora of Clarence R. and Florence N. Hanes, other published and unpublished florulas, countless personal communications, and personal experience with the flora in most sections of every township in Kalamazoo County. This expansion was made possible by frequent trips back to Kalamazoo County from the University of Illinois (where I was in graduate school) to visit my future wife at WMU. From 1998–1999 the flora continued to evolve, reaching its current form in approximately the spring of 2000 when Dr. Richard Brewer (WMU) was kind enough to read through and comment on an admittedly very rough draft of the manuscript. I continued to work on the manuscript periodically, but much work (including some field work) remained to be done to prepare the manuscript for publication. In June of 2000 I graduated with a master's degree in entomology from the University of Illinois, and moved to Harvard

University where I continued to work in spells on the manuscript until its completion in the spring of 2004.

My fascination with orchids and carnivorous plants started this journey, but over the last ten years of study I have become fascinated with the initially imposing grasses, sedges, pondweeds, hawthorns, brambles, and asters (many of which still perplex and command my attention). Clearly, a work like this is never finished, and doubtless, there are still numerous loose ends that remain. However, I am satisfied that my initial goal (to provide locally relevant data describing the habitat, distribution, and abundance of native and introduced vascular plant species known outside of cultivation in Kalamazoo County) has been accomplished. Due to other commitments I must leave what additional work remains to my successors.

ACKNOWLEDGMENTS

Many more people than can be mentioned here contributed in diverse ways to this flora. I must thank all of those who have commented on the manuscript, joined me in the field, examined specimens, and endured countless e-mail inquiries and phone calls, especially Richard Brewer (WMU), Michael R. Penskar (MNFI), Anton A. Reznicek (MICH), and Edward G. Voss (MICH). Completion of this flora was much facilitated by Dr. Edward G. Voss and the three volumes of the "Michigan Flora" that he so masterfully produced (Voss 1972, 1985, 1996). I could not have completed this book without his exhaustive keys, specimen database, and the countless annotations he made to herbarium specimens. I would also like to thank the countless property owners who generously allowed me access to their land.

Support in writing the manuscript came indirectly from Dr. Stephen B. Malcolm (WMU) and Dr. May R. Berenbaum (University of Illinois, Urbana-Champaign (U of I)) through their encouragement and tolerance of my forays into the Kalamazoo Flora and away from ongoing ecological and entomological writing and research for which I was employed. The WMU Lee Honors College helped pay for gasoline used on my near daily botanical expeditions during the summer of 1996. The Clarence R. and Florence N. Hanes fund, established at the bequest of Mrs. Hanes, provided support in 2002 to permit completion of herbarium studies, and to hire a short-term, part-time assistant to help with editorial details and with preparing the manuscript for publication. I am grateful to the trustees of the Hanes Fund and Mr. and Mrs. Hanes for providing me with this opportunity.

Special thanks are especially due to my wife, Katherine McKenna. Without her assistance, patience, and support, this flora surely would not have been completed. Katherine, it is to you that I dedicate this work.

INTRODUCTION

Landscape & Climate. Kalamazoo County covers approximately 576 sq. mi. and is composed of 16 townships, each approximately 36 mi. square (Figure 1). Rivers, streams, and 418 lakes and ponds greater than about one acre in size cover 3.2 % of the surface area. The largest lakes are Gull (1880 acres) and Austin (1050 acres). The Kalamazoo River traverses the county from near Augusta in the east to near Cooper in the north and is the largest waterway. Andrew's Creek, Augusta Creek, Bear Creek, Comstock Creek, Gourdneck Creek, the Gull Lake Outlet, Little Portage Creek, Portage Creek, the Portage River, Sand Creek, and Spring Brook are important smaller waterways. The land sur-

face consists of end moraines, till, and outwash, resulting from several major periods of continental glaciation, most recently the Cary substage of the Wisconsin glaciation (ca. 16,000 to 13,500 years ago). Glacial till occupies about 10% of the surface area and is confined to the SE quarter of the county. Outwash sediments, mainly sand, gravel, and some alluvium deposited by preglacial streams, occupy more than half of the surface area and are an important component of the landscape throughout the county. Lacustrine sand, silt, and clay deposited in the ancient lakes Alamo and Kalamazoo cover less than a fourth of the land surface. Shale bedrock underlies all of these deposits and is closest to the surface at the east edge of the county. The growing season in Kalamazoo County varies from approximately 145–155 days. Average annual precipitation varies only slightly from NE to SW (more in the SW), and averages approximately 89 cm./yr. (Dorr & Eschman 1971; Kalamazoo County Surveyor pers. comm. 2000).

Human History & Vegetation Patterns. The Potawatomi were the most recent Native Americans to occupy the area that would eventually become Kalamazoo County. They engaged in some agriculture, but were primarily hunter-gatherers. Through their use of fire, they played a significant role in the development and maintenance of the prairie and savanna flora of the region.

The first white trappers and traders entered the region in the 17th century. The celebrated French explorer, Rene Robert Cavelier, Sieur de La Salle, traveled east through the county passing through sugar maple forests, open woodlands, oak savannas, and prairies en route to Niagara in 1680 (Woodruff 1999). His correspondence provides the earliest documentation of the former prairie and savanna landscape of Kalamazoo County. Between 1826 and 1830, the area that would become Kalamazoo County was surveyed by employees of the federal government's General Land Office (GLO) (Voss 1978; Hodler et al. 1981; Comer et al. 1995). At this time Native American population density in Kalamazoo County was among the highest in Michigan. Most Native American settlements were then located on or near terrestrial prairies (Cremin & DeFant 1987; Cremin & Quattrin 1987; Fitting 1975; Stoneman 1982; Tanner 1987). The plat maps and field notes from the GLO surveys of the region provide perhaps the best available record of the native landscape of Kalamazoo County (Comer et al. 1997). Our current native flora is largely a vestige of this former landscape.

The first European settlers arrived in the area that would become Kalamazoo County by the late 1820s. Kalamazoo County was organized by an act of the territorial legislature and approved on 30 July 1830. By this time settlement was in full swing. In 1840, following the terms of the 1833 Treaty of Chicago, most remaining Native Americans were assembled at what would become the Michigan Central Station in the city of Kalamazoo and were taken away to reservations. The fate of the native landscape, flora, and fauna of Kalamazoo County was sealed.

History of Botanical Exploration. Kalamazoo County has a rich tradition of botanical exploration. Few areas in the upper Midwest have been so thoroughly botanized and can boast such a species-rich and relatively well-documented flora. The first official report on the plant life of Kalamazoo County came in

1837–1838 from a botanical survey of the two southern tiers of counties in Michigan as part of the Michigan Geological Survey, all under the direction of Douglass Houghton (see Appendix I) (McVaugh 1970). In 1876, Frank H. Tuthill of Kalamazoo published a paper in "The Botanical Gazette," reporting on plants he collected beginning in June 1870, mostly in the vicinity of the city of Kalamazoo (Tuthill 1876). An amateur botanist, Austin Churchill Roberts (A. C. Roberts) also collected plants at this time (from about 1870 to 1905), primarily within a couple hours' walking distance, mostly north of the city of Kalamazoo. Around the turn of the 20th century, numerous other collectors, including Oliver A. Farwell, Leslie A. Kenoyer, Charles F. Wheeler, and William J. Beal botanized in the area and otherwise contributed to the growing body of knowledge concerning the Kalamazoo County flora.

However, it was the botanical explorations of the amateur botanists Clarence R. Hanes and Florence N. Hanes of Schoolcraft that helped make the Kalamazoo County flora one of the best known in the country at that time (see Pitcher 1994). Their "Flora of Kalamazoo County Michigan, Vascular Plants," published in 1947, reported on 1749 species, varieties, and forms of plants found in Kalamazoo County, based almost entirely upon their extensive personal herbarium, started in 1933. According to Voss (1963), "this book is the finest local flora of its type for any region in the Upper Great Lakes area. . . ." Several contemporaries of the Haneses regularly contributed to their botanical work and herbarium collection. Among the most significant was Frederick W. Rapp (Vicksburg). Rapp was an especially prolific collector. Several thousand of his specimens are housed at the WMU Hanes herbarium (see Appendix II).

Over the last 50 years, the Haneses' (1947) "Flora of Kalamazoo County, Michigan Vascular Plants" has figured prominently in the study of the Michigan flora and beyond. As such, it seems appropriate to present here an overview of the Haneses' botanical endeavors in Kalamazoo County. Perhaps the best overview is provided by the Haneses themselves. The following excerpts are from a red, leather-bound journal (at WMU) in which the Haneses provide an introduction and guide to their herbarium collection including a chronology and some background describing their floristic work. The entire journal appears to have been written by Clarence over a period of several years. It bears the title "Background of the herbarium and flora."

"In 1891 while [I was] in High School a herbarium of about 80 specimens was made. A part of these were of garden trees and plants. Also Mrs. Hanes made a herbarium while in High School. This dealt more with the uncultivated plants and contained some quite uncommon species such as Arethusa bulbosa and the Dwarf Flowering Dogwood. . . . At the University, instead of continuing in a line of work that might have been more congenial, language, history, and economics were the subjects taken. About 1905-1910 the ferns and orchids of the Sugarloaf Lake Region were studied quite thoroughly and a collection was made at that time of the ferns. Orchids were not collected, but several varieties were carried to Mrs. Hanes' mother while I was getting acquainted with my future wife. Probably this accounts for the fine teamwork that has produced the present herbarium.

We know now three to four hundred plants but had only herbarium specimens

of the ferns and part of the shrubs and trees. Our interest continued in our flora but it was not until the spring of 1933 that we seriously decided to get a permanent record of the plant life within a radius of five miles of Schoolcraft.

The Depression had come and our losses were quite serious. . . . We decided that it would be far better to take up a line of work that would be valuable to us in keeping our minds occupied and might also add something of value to the knowledge of the flora of our county and state.

Had we known the immense amount of labor required to produce the herbarium, we might have hesitated to start such an undertaking. . . . We had never seen a large herbarium and had no access to one, so our classification depended upon grubbing out for ourselves from either Gray's manual or Britton and Brown's flora, the correct place each plant should occupy. It is not meant by this that we did not have outside help. Lately we have had many of the more difficult genera checked and often determined by specialists in these groups. This aid has usually been freely and generously given.

In the spring of 1933 we were familiar with only a few scientific names. Also the technical descriptive terms were strange and new. The difference between grasses and sedges was vaguely understood. . . . From the start we made a practice of collecting everything that we considered different from what we already had. . . . During the winter months when there was more leisure, we profited by this habit. . . . Some of our rare or infrequent plants have been added because of this proclivity. . . .

During 1933 most of the collecting was done not more than five mi. from Schoolcraft. The means of transportation was a bicycle, so Mrs. Hanes only accompanied when the trip was on foot. A Ford pickup was given us in the fall of 1933 and from that time it has been "Botanizing with Lizzie". . . . Since possession of this car we have widened our territory to include all of Kalamazoo County. So far, January 1937, we have visited only a portion of the lakes, streams, woods and other collecting grounds. Rarely do we go to new territory or return to an old collecting field without discovering something new about the plants we have already collected.

At one time we had hoped to be able to pay part of our expenses through the knowledge of the flora of the county, but to the present we have never received a cent from this source. We have, however, taken much pleasure in this work and no years have been happier than the last four which have been given so intensively to bringing into the herbarium about 1400 species and varieties of the flora of Kalamazoo County.

During the two years since the above was written, our herbarium has been increased by the addition of almost two hundred specimens. These are all from Kalamazoo County. During our six years of intensive botany work, we have added some thirty plants to the records of the flora of Michigan besides finding range extensions for many more. These have been reported in Rhodora or in papers before the Michigan Academy of Sciences, Arts, and Letters.

The manuscript for a Flora of Kalamazoo County has been written. At first this was somewhat incomplete as the stations cited for specimens were naturally those nearest to our home, but now with more extended trips the flora has become representative of the county as a whole. No means of publication is in sight

at present. Such a flora is of value for no county of the state has been as intensively botanized as that of Kalamazoo. Also such a flora would help materially in the preparation of a flora of the state.

. . . At the beginning of this year of 1939, we are trying to arouse some enthusiasm in Michigan plant life in the Department of Conservation. At least our initial efforts have been met with some encouragement.

March 31, 1947 . . . . During the time since 1939, when the last entry was made here, we have continued our collections and studies until we have now in the herbarium 1749 different species, varieties, and forms. It was during these years between 1939 and 1947 that we did some of our most important work in botany. This was with the genus Rubus, the blackberry clan. With the aid of F. W. Rapp of Vicksburg about 22 new species of Rubus have been found in the county.

The flora meanwhile was revised, and added to yearly. Still there was no clear idea how it ever would get into book form. At least we were satisfied that if it ever did the expense must be borne by ourselves. Twelve dollars received from talks on the county flora over a period of 14 years was the nest egg. Fees, as executor of a rather large estate, made things look brighter, so it seemed feasible to try to get our book printed. In August of 1945 specifications were submitted to us. For 500 copies of a book of 192 pages we were to pay $1240.00 and $4.50 a page thereafter. This proposition fell through because of a lack of help but later the company offered to farm out the typing and also increased the price about 20 percent.

Not satisfied with this arrangement we finally made our contract with the Southworth-Anthoensen Press of Portland, Maine. This contract was for $1200.00 for 500 copies of a 60-page book, and $4.25 for each additional page. When finally published, the flora had 12 pages of introduction, and 295 pages of text and index.

The fourteen new species of blackberries are a distinctive feature of the flora. These were described for us by Liberty Hyde Bailey, who also loaned us the plates made from drawings by Florence Mekeel.

Finally dreams were realized for on February 28, 1947 six copies of our book arrived by mail. We now saw 14 years of study and pleasure brought into a permanent form. The volume is a beautiful example of the bookmaking art. Paper and binding are good; the printing is excellent; the blackberry drawings stand out distinctly. There are errors—some of ours and some of the printers.

The flora is the type of book that has little appeal to the public of the present day, but we have been pleased with its reception in Schoolcraft, our hometown. The letters and opinions of botanists throughout the United States have been very favorable. We have appreciated this for it is to specialists in the field of plant study that we must look for the final judgment of our work.

There have been several fine reviews of the flora, all unsolicited. These have been by Prof. M. L. Fernald in Rhodora, by Wm. B. Drew in Ecology, by ex-governor Chase S. Osborne in the Sault St. Marie Evening News, by Edgar Anderson in the American Midland Naturalist, by Ray G. Freisner in the Journal of the New York Botanical Garden, and by Henry T. Darlington in Michigan History Magazine."

Many others have been involved with floristics and plant ecology in Kalama-

zoo County, especially over the last 40 years. It is not possible to list them all, or their contributions here. The diversity and scope of their work has not only enriched our understanding of the regional flora and natural history, but has also provided me with substantial supporting information for use in writing this flora.

METHODS

Overview. This floristic survey of Kalamazoo County is based primarily on the results of field surveys and herbarium studies conducted by the author beginning in September 1994 and continuing through September 2003. My field surveys were guided primarily by the notes, publications, and herbarium specimens of the late Clarence Robert Hanes (1874–1956) and Florence Nutten Hanes (1886–1966) (Hanes & Hanes 1947). In addition to known field sites, new sites were sought for rare and otherwise noteworthy plants and plant communities. These are treated in relatively more detail in this flora than plants and plant communities that are mostly better known.

The SW quarter of the county in the vicinity of Schoolcraft received the best coverage in my field surveys as it did in those of the Haneses. Studying many of the same sites permitted me to evaluate how the flora has changed over the years.

The Kalamazoo County flora is well documented in herbaria. For this reason, and because time and resources were not generally available to prepare and/or maintain dried specimens, collections were generally not made. Instead, photographs were often taken, and limited collections were made only to help identify problematic taxa (and then usually discarded) and to document plants previously unreported from the county. The few specimens that were maintained are deposited at WMU and MICH.

During preparation of this flora I have examined all herbarium specimens collected from Kalamazoo County that are housed at WMU (including unmounted material from the collections of F. W. Rapp, L. A. Kenoyer, and others), and all specimens (including those collected by A. C. Roberts) housed at the Kalamazoo Valley Museum (KVM). Some specimens have been examined or otherwise documented from MICH, MSC, ALBC, BLH, GH, ILL, NY, and TEX. I have not examined the F. W. Rapp specimens at the Kalamazoo Nature Center (they were brought to my attention after completion of herbarium studies), and I have only examined a few select specimens from the Kellogg Biological Station Herbarium (KBSMS). Though I have made no formal count, many more than 5,000 herbarium specimens have been evaluated in preparing this flora. Sources for reports of plants that are not included in the Haneses' flora are indicated unless they are based on specimens at WMU, in which case no further information is generally provided. Herbaria are referred to in the text by their accepted abbreviations. Specimen numbers are not usually provided.

Collector(s) and other specimen label data are occasionally provided for noteworthy collections in the text of the annotated checklist. Annotations made by specialists familiar with the Michigan flora (especially A. A. Reznicek (grasses

and sedges), E. G. Voss (all taxa), H. E. Ballard (violets), and W. H. Wagner, Jr. (ferns and allies) were sometimes accepted as given when the identification of a specimen was not clear to me.

Most commentary refers to observations made by the author in the field in Kalamazoo County. Observations drawn from herbarium specimens, specimen label data, and/or other sources, are generally cited as such or otherwise indicated.

Family names and order in the list follow Voss (1972, 1985, 1996). Family names used by the Haneses are provided in parentheses. Genera are listed alphabetically within families, and species are listed alphabetically within genera, to facilitate browsing by those unfamiliar with other potential arrangements.

Common names are used in the text only rarely, and usually just for woody dominants. In most other cases, scientific names are used to avoid ambiguity. Common names in the annotated checklist are mostly from Voss (1972, 1985, 1996). Common names from Hanes & Hanes (1947) are sometimes given when they are not provided in Voss (1972, 1985, 1996).

For scientific names of Monocots (except Orchidaceae) and Dicots, I have followed Voss (1972, 1985, 1996). For the Orchidaceae I have followed Case (1987) (with a few exceptions), and for Pteridophytes and allies I have followed Flora of North America Volume II (1993). Other references have been consulted from time to time to clarify various taxonomic and ecological issues. Among these references are Barnes & Wagner 1981; Billington 1952; Billington 1949; Braun 1967; Cochrane et al. 1984; Cole 1901; Cooperrider 1995; Darlington 1945; Deam 1940; Eddy 1996; Fassett 1976; Hagenah 1955; Hanes 1938, 1939, 1940, 1941, 1942, 1943, 1945a and 1945b, 1947, 1950; Lellinger 1985; Musselman et al. 1971; Reznicek & Catling 1989; Rill 1983; Swink & Wilhelm 1994; University of Wisconsin Herbarium [Web Page] accessed January–April 2003; Wheeler & Smith 1881.

I have tried to include the Latin binomials used by the Haneses (1947) in the annotated checklist to facilitate cross-referencing. This was not always possible due to the many sub-specific taxa recognized by the Haneses, difficulty finding specimens in the herbarium that served as the basis for the Haneses' reports, and because there have been many changes in nomenclature since the publication of the Haneses' flora. Occasional mention is made of unusual forms; however, I have not generally recognized sub-specific taxa. I have included treatments in the annotated checklist for some widely recognized hybrids in the same format as for species (after Voss 1972, 1985, 1996). Treatments of lesser-known hybrids are included in the treatment for one of their presumed parents (whichever comes first alphabetically), regardless of their fertility. I have only reported some of the better-known hybrids, and especially those in Voss (1972, 1985, 1996). Authors are not provided for named hybrids. Taxa that are recognized in the annotated checklist, but not in the Michigan Flora (Voss 1972, 1985, 1996) and a few other minor taxonomic differences, are generally indicated where appropriate in the text.

Keys from *Flora of North America Volume II* (1993) can be used for ferns and allies, keys in Case (1987) can be used for most Orchidaceae, and the excellent keys in Voss (1972, 1985, 1996) can be used for most other taxa.

This flora does not usually provide specific locality data, especially for rare plants and orchids, to reduce the potential for exploitation, and because these data are mostly available elsewhere.

I have included references in the annotated checklist to relevant publications that may be of interest to the reader. Unpublished papers, reports, or manuscripts are also cited insofar as I am aware of them.

Frequency & Distribution. The estimated frequency, distribution, and habitat (typical plant communities) for most plant species reported from Kalamazoo County are given in the annotated checklist. Estimates are based primarily upon observations made by the author between September 1994 and September 2003, but data from herbarium specimens, and other reports made after 1 January 1990 have also been considered. Frequency is described as very rare, rare, occasional, or common, and refers to stems, not plants for species in which the distinction is not easily made. These descriptors have been applied subjectively, but I have made an effort to apply these and subsequent terms as consistently as possible. Distribution is described for each species in the annotated checklist as "throughout" the county, or restricted to specified regions and/or habitats. These descriptors should be considered my subjective interpretation of the aforementioned data.

Current Status. Plants designated "Extinct" have not been found at all previously known sites and new sites have not been located despite extensive searches. None of these species have been collected since publication of the Haneses' flora in 1947, or they have been demonstrably extirpated from all known sites since then. For these species it is unlikely that extant sites will be located in Kalamazoo County (barring the unlikely event that they recolonize from outside of the county). I have used this designation only for species that I strongly believe to be extinct, and qualify the commentary when necessary. I have reserved this term for plants that are/were likely native (e.g., I have listed *Echinacea purpurea* as extinct since native plants are not known to persist; however, plants still occur throughout in waste places, but are generally thought to originate from cultivated, non-native specimens). Non-native species that no longer occur in Kalamazoo County are designated "No longer known."

The label "Current status uncertain" is applied to plants for which data (post 1 January 1990 herbarium specimens, observations in the field, etc.) are not sufficient to assess contemporary distribution and abundance. This designation includes plants for which no extant sites are known despite some effort (but not exhaustive effort) to relocate them. Naturally occurring populations of these species may still remain unreported or undiscovered in Kalamazoo County. I have often altered this designation to read "Current status uncertain, very rare if still extant," when some data (but not conclusive data) are available to suggest that a plant is no longer extant, or if it is extant, it must be very rare.

Plants for which no extant sites are known, and for which little or no effort has been made to locate extant sites are designated "Current status unknown." Some species given this designation, and a few species designated "Current status uncertain" are not necessarily rare (although many clearly are), but may be

unfamiliar or only vaguely familiar to me. This is especially true of some of the grasses, sedges, pondweeds, and hawthorns. Relatively recent collections or observations of these species are lacking or otherwise insufficient to estimate current status.

Habitat descriptions are given using the community types characterized in Appendix III. When published or personally communicated observations have contributed significantly to the treatment of a species, I have cited their source. When not otherwise specified, observations made by the Haneses refer to their 1947 flora.

Plant Communities. Most plants in Kalamazoo County still occur in one or more discrete plant communities (here defined as an assemblage of plant populations in a given habitat with characteristic growth form, structure, seasonality, dynamics, and composition). Each species account in the annotated checklist includes the abbreviation(s) for plant communities in which the plant is/was likely to be found (Table 1 & Appendix III). When a plant is associated with an anthropogenic feature of the landscape, a more general "location" may be given such as "old fields," "roadsides," or "RR rights-of-way." Unless otherwise specified, reported habitats are based on my interpretation of herbarium specimen label data, and my field experience in Kalamazoo County and beyond. Often,

TABLE 1. Kalamazoo County Plant Communities recognized in the Annotated Checklist of Vascular Plants.

Aquatic/Wetland
- *Open Aquatic/Wetland*
  - Submergent Marsh (SUB-MARSH)
  - Emergent Marsh (EM-MARSH)
    - Coastal Plain Marsh (COASTAL-PLAIN-MARSH)
  - Wet Meadow (WET-MEADOW)
  - Bog (BOG)
  - Fen (FEN)
  - Wet Prairie (WET-PRAIRIE)
- *Shrub Dominated Wetland*
  - Inundated Shrub Swamp (SHRUB-SWAMP)
  - Shrub-Carr (SHRUB-CARR)
- *Forested Wetland*
  - Tamarack Swamp Forest (TAMARACK-SWAMP)
  - Red Maple Swamp Forest (RED-MAPLE-SWAMP)
  - Black Ash Swamp Forest (ASH-SWAMP)
  - Mixed Hardwood Swamp Forest (HARDWOOD-SWAMP)
  - Floodplain Forest (FLOODPLAIN-FOREST)

Terrestrial
- *Terrestrial Prairie* (TERRESTRIAL-PRAIRIE)
- *Terrestrial Shrub/Savanna*
  - Black Oak Barren (BLACK-OAK-BARREN)
  - Bur Oak Savanna (BUR-OAK-SAVANNA)
  - White Oak Savanna (WHITE-OAK-SAVANNA)
- *Terrestrial Forest*
  - Sugar Maple Forest (SUGAR-MAPLE-FOREST)
  - Oak Hardwood Forest (OAK-HARDWOOD-FOREST)

only the plant communit(ies) in which a specific plant is most likely to be found are reported (except for prairie and savanna inhabitants, and rare or otherwise unusual plants, for which I have tried to provide more comprehensive habitat lists). When recent specimens or observations are limited or lacking, I have still tried to provide a best estimate of frequency, distribution, and habitat (indicated by a "?"). I have made an effort to apply these descriptors as consistently as possible. However, they should be considered my subjective interpretation of the available data.

I occasionally use the terms remnant and relict to describe Kalamazoo County plant communities. Remnants are defined as portions of once more extensive plant communities. Relicts are usually considered to be plants or other natural features that persist despite the complete or nearly complete loss of the plant community in which they once occurred. Most of the time these terms are inferred since nothing but remnants and relicts remain of most Kalamazoo County plant communities.

When disturbed remnants of a plant community serve as the "location" for a species, this community is listed in the annotated checklist without qualification despite its likely present deviation (sometimes significant) from pre-European settlement conditions. For example, some communities such as terrestrial prairies are represented only by relictual populations of the plants they once supported. Others, such as black oak barren, bur oak savanna, and white oak savanna, are represented by overgrown (e.g., fire suppressed) or otherwise altered remnants that retain few characteristics of their pre-European settlement namesakes. I continue to use the names of these nearly extinct plant communities to describe the remnants that persist despite their often conspicuous deviations from the presumed pre-European settlement state. In Appendix III I have included an overview of the current and former plant communities of Kalamazoo County.

Kalamazoo County plant communities vary continuously along numerous ecological gradients such that the names and descriptions used in this flora should be viewed as a means of facilitating their identification and study, rather than definitive classifications. I have used the terms wet, wet-mesic, mesic, dry-mesic, and dry rather subjectively to describe the position of various features of plant communities along a moisture continuum from wet to dry. These terms are more often used to describe prairies, savannas, and oak forests than other plant communities.

Native vs. Non-native Plants. Species that are known to be introduced, partly native and partly introduced, questionably native, escapes from cultivation, naturalized weeds, rare waifs, or otherwise a component of the flora outside of cultivation, are often indicated as such in the annotated checklist. Non-native plants whose status outside of cultivation is uncertain, including exotic species that have not been seen in Kalamazoo County in many years, are listed because they may one day be rediscovered growing outside of cultivaton. I have used my best judgment in deciding which records should be accepted. When possible I have indicated the status of non-native plants as one of the following (after http://www.dnr.state.wi.us/org/land/er/invasive_species.html accessed 2/03).

- ***Adventive***: established from a native source but not likely a long-persistent component of the local flora
- ***Locally established***: local outside of cultivation.
- ***Widely established***: widespread throughout outside of cultivation.
- ***Rarely escaped***: only rarely encountered outside of cultivation. When found, usually only one or a few plants are encountered.
- ***Range change/extension***: once only known outside of Kalamazoo County, but now apparently resident.

Native plants are those that are assumed to have occurred in Kalamazoo County before widespread European settlement. I have used Voss (1972, 1985, 1996), and my own judgment in determining the status of questionable species.

THE FLORA OF KALAMAZOO COUNTY

Synopsis. This flora covers 1612 plant species and 39 hybrids known from outside of cultivation in Kalamazoo County. Of these 1651 taxa, more than 400 are non-native or partly introduced. The most species-rich genus in Kalamazoo County is *Carex*. More species of *Carex* (111) have been collected in Kalamazoo County than from any other county in Michigan. Other species-rich genera include *Aster* (19), *Panicum* (24), *Polygonum* (18), *Potamogeton* (20), *Salix* (18), *Solidago* (17), and *Viola* (19). The annotated checklist includes 133 species that were not reported in the Haneses' flora (1947). These species include new introductions to the flora (including adventives, range changes, etc.), presumed native species not before documented, and additions due to changes in taxonomy and previous misidentification. Several species reported by the Haneses (1947) have been excluded from this flora due to changes in taxonomy, previous misidentification, and lack of extant documentation.

Rare Species. Kalamazoo County has more plants listed as Extinct, Endangered, Threatened, or Special Concern by the state of Michigan than any other county in Michigan (Table 2) (Michigan Natural Features Inventory [Web Page] accessed 5/04). These plants are mostly restricted to prairie, oak savanna, and wetland plant communities, and many are already extinct in Kalamazoo County (Tables 2 & 3). Some rare species are (or were) here at the edge of their known distributions, or are geographically disjunct from other known populations (Barnes 1993; Wagner et al. 1977). Many species in addition to those listed as Extinct, Endangered, Threatened, or Special Concern by the state of Michigan, are very rare, extinct, or potentially extinct in Kalamazoo County (Tables 3–5).

Several species are known in Michigan only from Kalamazoo County. Among these rarities (not all still extant, and some perhaps adventive) are: *Aristida dichotoma, Aster paternus, Carex aggregata, Carex leavenworthii, Carex mesochorea, Carex retroflexa, Carex straminea, Cuscuta pentagona, Glyceria acutiflora, Lemna valdiviana, Liatris punctata, Lygodium palmatum, Panicum calliphyllum,* and *Porteranthus trifoliatus*.

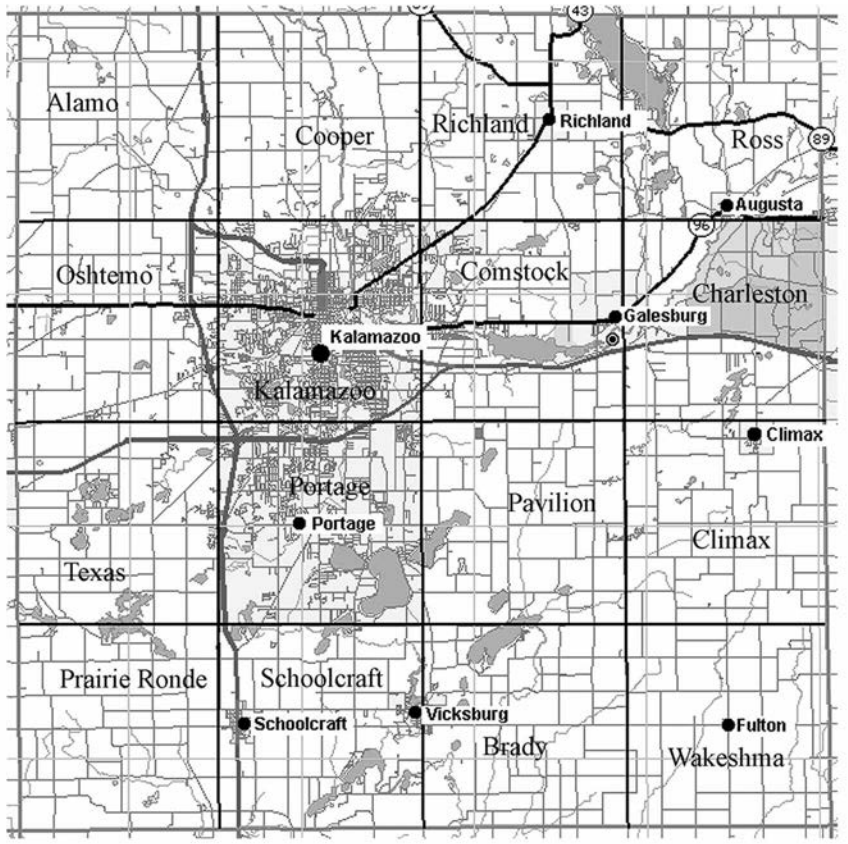


FIGURE 1. Political map of Kalamazoo County including townships, major roads, cities, and towns.

Excluded Species. An incomplete list of species reported in the literature as occurring outside of cultivation in Kalamazoo County, but for which no specimens or other significant documentation are known, is presented in Table 6. These species are not listed in the annotated checklist.

Phytogeography. Rare or otherwise unusual plants that mostly occur north of Kalamazoo County include *Arctostaphylos uva-ursi, Cornus canadensis, Diervilla lonicera, Eriophorum tenellum, Gaultheria hispidula, Hippuris vulgaris, Linnaea borealis, Orthilia secunda, Prunus pumila, Pyrola asarifolia, Rubus canadensis* (unusually far south here), *Smilacina trifolia*, and *Sorbus decora*.

An especially interesting element of the flora is the large number of plants usually associated with coastal plain marshes in the SE United States (Fernald 1942; Reznicek 1994). A few examples include *Eleocharis melanocarpa, Fuirena squarrosa, Hemicarpha micrantha, Polygala cruciata, Psilocarya scirpoides, Rhexia virginica, Rhynchospora macrostachya,* and *Rotala ramosior.*

TABLE 2. Classification by habitat of Michigan extinct, endangered, threatened, and special concern plants known from Kalamazoo County (species list from http://web4.msue.msu.edu/mnfi/ accessed 5/04). I have listed species typical of multiple plant communities in more than one cell.

Community	Extinct	Endangered	Threatened		Special Concern
Open Aquatic/ Wetland Submergent Marsh Emergent Marsh Coastal Plain Marsh Wet Meadow Bog Fen Wet Prairie	*Glyceria acutiflora* *Lemna valdiviana*	*Agalinis gattingeri* *Platanthera leucophaea* *Carex straminea* *Scleria pauciflora*	*Berula erecta* *Calamagrostis stricta* *Carex seorsa* *Cypripedium candidum* *Eryngium yuccifolium* *Filipendula rubra* *Fuirena squarrosa* *Gentianella quinquefolia* *Isotria verticillata* *Juncus scirpoides* *Lechea pulchella*	*Muhlenbergia richardsonis* *Nelumbo lutea* *Panicum leibergii* *Platanthera ciliaris* *Poa paludigena* *Psilocarya scirpoides* *Sabatia angularis* *Stellaria crassifolia* *Valeriana edulis* *Zizania aquatica* var. *aquatica*	*Arnoglossum plantagineum* *Carex festucacea* *Cyperus flavescens* *Eleocharis engelmannii* *Eleocharis equisetoides* *Eleocharis melanocarpa* *Hemicarpha micrantha* *Hibiscus moschoetus* *Hypericum gentianoides* *Ludwigia alternifolia* *Lycopodiella appressa* *Polygala cruciata* *Rhexia virginica* *Rhynchospora macrostachya* *Rotala ramosior* *Scleria triglomerata* *Sporobolus heterolepis*
Shrub Dominated Wetlands Inundated Shrub Swamp Shrub-Carr					*Cuscuta campestris* *Cuscuta polygonorum* *Liparis liliifolia*
Forested Wetlands Tamarack Swamp Red Maple Swamp Black Ash Swamp Mixed Hardwood Swamp Floodplain		*Carex straminea* *Lygodium palmatum* *Populus heterophylla*	*Carex albolutescens* *Carex lupuliformis* *Diarrhena americana* *Dryopteris celsa* *Lycopus virginicus*	*Morus rubra* *Panax quinquefolius* *Valerianella chenopodiifolia*	*Carex frankii* *Euonymus atropurparea* *Gymnocladus dioicus* *Hybanthus concolor* *Liparis liliifolia* *Quercus shumardii* *Viburnum prunifolium*

Terrestrial Prairie, Shrub, & Savanna Terrestrial Prairie Black Oak Barren Bur Oak Savanna White Oak Savanna	*Aristida dichotoma* *Buchnera americana* *Digitaria filiformis* *Echinacea purpurea* *Liatris punctata*	*Baptisia leucophaea* *Gentiana alba* *Platanthera leucophaea*	*Artemisia ludoviciana* *Asclepias hirtella* *Aster sericeus* *Astragalus canadensis* *Besseya bullii* *Bouteloua curtipendula* *Coreopsis palmata* *Draba reptans* *Eryngium yuccifolium* *Helianthus mollis* *Ipomoea pandurata*	*Linum virginianum* *Phlox bifida* *Platanthera ciliaris* *Silene stellata* *Silphium integrifolium* *Silphium laciniatum* *Silphium perfoliatum* *Solidago missouriensis* *Trichostema dichotomum* *Viola pedatifida*	*Amorpha canescens* *Angelica venenosa* *Arabis missouriensis* var. *deamii* *Asclepias purpurascens* *Astragalus neglectus* *Baptisia lactea* *Cirsium hillii* *Cuscuta pentagona* *Helianthus hirsutus*	*Hypericum gentianoides* *Kuhnia eupatorioides* *Lechea minor* *Lechea stricta* *Linum sulcatum* *Liparis liliifolia* *Penstemon pallidus* *Scleria triglomerata* *Scutellaria elliptica* *Sporobolus heterolepis*
Terrestrial Forest Sugar Maple Forest Oak Hardwood Forest		*Castanea dentata (introduced)*	*Carex oligocarpa* *Corydalis flavula* *Dryopteris celsa* *Eupatorium sessilifolium* *Orchis spectabilis* *Porteranthus trifoliatus*	*Hydrastis canadensis* *Panax quinquefolius* *Spiranthes ovalis* *Trillium sessile* *Triphora trianthophora*	*Adlumia fungosa* *Agrimonia rostellata* *Liparis liliifolia* *Scutellaria elliptica* *Smilax herbacea*	*Spiranthes ochroleuca* *Viburnum prunifolium*

TABLE 3. Native plants (including possibly adventive species) that are thought to be "Extinct" in Kalamazoo County.

Adlumia fungosa	*Eupatorium sessilifolium*	*Penstemon pallidus*
Agalinis gattingeri	*Gentiana alba*	*Platanthera hookeri*
Arctostaphylos uva-ursi	*Grindelia squarrosa*	*Platanthera leucophaea*
Aristida dichotoma	*Helianthus maximilianii*	*Potentilla arguta*
Asclepias hirtella	*Helianthus petiolaris*	*Pycnanthemum tenuifolium*
Aster paternus	*Hippuris vulgaris*	*Rosa setigera*
Aster sericeus	*Houstonia canadensis*	*Selaginella rupestris*
Baptisia leucophaea	*Lechea minor*	*Silphium laciniatum*
Bromus kalmii	*Lechea pulchella*	*Silphium terebinthinaceum*
Buchnera americana	*Lemna valdiviana*	*Spiranthes lacera*
Corallorhiza trifida	*Liatris punctata*	*Thaspium trifoliatum*
Echinacea pallida	*Linum sulcatum*	*Trichostemma dichotomum*
Echinacea purpurea	*Nelumbo lutea*	*Triphora trianthophora*
Equisetum scirpoides	*Penstemon hirsutus*	*Tsuga canadensis*

TABLE 4. Native plants (including possibly adventive species) listed in the annotated checklist as "Current status uncertain, very rare if still extant." These species remain unaccounted for, but there is still a chance that they persist in unsearched areas of the county.

Agalinis tennifolia	*Eleocharis engelmanii*	*Phlox bifida*
Allium cernuum	*Epigaea repens*	*Physostegia virginiana*
Arenaria stricta	*Equisetum palustre*	*Platanthera orbiculata*
Aristida necopina	*Erigeron pulchellus*	*Polygala verticillata*
Aster praealtus	*Gaultheria hispidula*	*Porteranthus trifoliatus*
Aster shortii	*Glyceria acutiflora*	*Potamogeton richardsonii*
Astragalus canadensis	*Helianthus hirsutus*	*Psilocarya scirpoides*
Astragalus neglectus	*Hibiscus moscheutos*	*Ptelea trifoliata*
Baptisia tinctoria	*Hieracium venosum*	*Quercus shumardii*
Calamovilfa longifolia	*Hybanthus concolor*	*Rhexia virginica*
Carex festucacea	*Hypericum gentianoides*	*Scleria triglomerata*
Carex lupuliformis	*Ipomoea pandurata*	*Senecio pauperculus*
Carex oligocarpa	*Isotria verticillata*	*Solidago missouriensis*
Carex umbellata	*Juncus scirpoides*	*Sorbus decora*
Carex virescens	*Lechea stricta*	*Sparganium fluctuans*
Cuscuta campestris	*Linnaea borealis*	*Sparganium minimum*
Cuscuta cephalanthi	*Ludwigia alternifolia*	*Spiranthes romanzoffiana*
Cuscuta coryli	*Muhlenbergia richardsonis*	*Spiranthes vernalis*
Cuscuta pentagona	*Opuntia humifusa*	*Stipa spartea*
Cuscuta polygonorum	*Orobanche uniflora*	*Trillium erectum*
Cyperus flavescens	*Orthilia secunda*	*Valeriana edulis*
Diarrhena americana	*Panicum calliphyllum*	*Valerianella chenopodiifolia*
Diervilla lonicera	*Panicum philadelphicum*	
Digitaria filiformis	*Parthenium hispidum*	

Several other species have ranges that are basically Eastern North American including *Lygodium palmatum* (unusually disjunct to the NW from the rest of its range), and *Euthamia graminifolia* (infrequent, but not especially rare).

A large number of rare species extend into the county from the south, and are here at or near their extreme northern limits. A few of these include *Aesculus glabra, Gymnocladus dioicus, Hybanthus concolor, Platanthera ciliaris, Populus heterophylla, Porteranthus trifoliatus,* and *Rhynchospora globularis*.

Those specifically from the southwest and west (and presumably native) are

TABLE 5. "Very rare" plants (including possibly adventive species) in the annotated checklist.

Aesculus glabra	*Eryngium yuccifolium*	*Populus heterophylla*
Agrimonia rostellata	*Erythronium albidum*	*Prunus pumila*
Angelica venenosa	*Euonymus atropurpurea*	*Rhus aromatica*
Arabis missouriensis	*Filipendula rubra*	*Rhynchospora fusca*
Arethusa bulbosa	*Gaura biennis*	*Scheuchzeria palustris*
Asclepias purpurascens	*Gentianella quinquefolia*	*Scleria pauciflora*
Asclepias viridiflora	*Helianthus mollis*	*Silene stellata*
Besseya bullii	*Kuhnia eupatorioides*	*Silphium perfoliatum*
Carex albolutescens	*Liatris cylindracea*	*Smilax herbacea*
Carex frankii	*Lilium philadelphicum*	*Spiranthes lucida*
Carex jamesii	*Lithospermum canescens*	*Spiranthes ochroleuca*
Carex straminea	*Lycopodiella inundata*	*Sporobolus heterolepis*
Chaerophyllum procumbens	*Lygodium palmatum*	*Tephrosia virginiana*
Cirsium hillii	*Lysimachia terrestris*	*Trillium sessile*
Coeloglossum viride	*Panicum leibergii*	*Viola pedatifida*
Coreopsis palmata	*Platanthera ciliaris*	*Xyris torta*
Eleocharis quadrangulata	*Platanthera flava*	
Eriophorum tenellum	*Polygala cruciata*	

mostly prairie plants and include; *Asclepias hirtella, Aster sericeus*, *Baptisia leucophaea, B. lactea, Eryngium yuccifolium, Liatris punctata, Panicum leibergii, Silphium integrifolium,* and *Viola pedatifida*.

Muhlenbergia richardsonis and *Valeriana edulis* are interesting Cordilleran disjuncts (Brodowicz 1989; Fernald 1942; Hanes 1942; McCann 1979; Peattie 1922; Voss 1972).

Introduced Species. Introduced (exotic) plants are a significant component of the Kalamazoo County flora, and today account for more than 25% of species. Quantitative data are mostly lacking, but clearly exotic plants vary considerably in their ability to invade native plant communities and in their effects on native vegetation. *Lonicera ×bella* and its parents *L. morrowii* and *L. tatarica* (exotic honeysuckles) form near monocultures in the understories and at the edges of many oak hardwood forests, shading out native understory vegetation. *Alliaria petiolata* (Garlic Mustard) is a serious threat to the understory flora of sugar maple forests and most other lightly shaded habitats. *Robinia pseudoacacia* (Black Locust) has invaded many former prairies, savannas, and forest edges, and is shading out the last vestiges of native vegetation that cling to existence in the marginal habitats it prefers. *Lythrum salicaria* has invaded emergent marshes, including globally rare coastal plain marshes, and exotic strains of *Phragmites australis* have formed near-monocultures in bog, fen, wet meadow, wet prairie, and emergent marsh plant communities. These are just a few of the many problematic introduced species in Kalamazoo County.

Some plants such as *Gleditsia triacanthos*, *Phalaris arundinacea, Phragmites australis, Plantago rugelii*, *Portulaca oleracea,* and *Typha latifolia* (to name just a few) are probably represented by both native and exotic genotypes in Kalamazoo County.

Current Landscape & Flora. The current landscape of Kalamazoo County retains little of its original land cover as reported by the GLO surveys of

TABLE 6. Plants attributed to the flora of Kalamazoo County but not included in the Annotated Checklist.

Name	Source	Reason for Exclusion
Agropyron spicatum	Hanes & Hanes 1947	Not in Voss 1972
Carya tomentosa	Elliott 1960	No specimen, doubtful ID, not in Voss 1985 (see Manning 1973)
Chenopodium pratericola (=*C. dessicatum*)	Hanes & Hanes 1947	Immature material lacking fruit, not recognized by Voss 1985 (see Voss 1985)
Chenopodium standleyanum	Hanes & Hanes 1947	No specimen, not in Voss 1985
Chenopodium urbicum	Hanes & Hanes 1947	No specimen, not in Voss 1985
Cleome serrulata	Meagher & Tonsor 1992	No specimen, not in Voss 1985
Crataegus dodgei	Hanes & Hanes 1947	No specimen, not in Voss 1985
Diplotaxis tenuifolia	Elliott 1960	No specimen known
Euphorbia humistrata	Elliott 1960	Two purpoted specimens at KBSMS not examined, not in Voss 1985
Fragaria vesca	Hanes & Hanes 1947	Not in Voss 1985
Galeopsis tetrahit	Elliott 1960	No specimen known, not in Voss 1996
Iris versicolor	Brewer 1965	No specimen, out of range, probably *I. virginica*
Juniperus horizontalis	Elliott 1960	No specimen known, not in Voss 1972
Lactuca floridana	Hanes & Hanes 1947	No specimen, not in Voss 1996
Lycium barbatum (the Haneses' (1947) *L. halmifolium*)	Hanes & Hanes 1947	No specimen, not in Voss 1996
Quercus imbricaria	Beal 1903, Otis 1931	No specimen, not in Voss 1985 (see Wagner & Schoen 1976)
Rosa nitida	Elliott 1960	No specimen, not in Voss 1985
Thalictrum pubescens	Elliott 1960	No specimen, out of range, probably *T. dasycarpum*

1826–1830 (Figures 4–6). Vanishingly little of the landscape has escaped cultivation, pasturing, logging, or other conversion. No significant tracts of original wet prairie, terrestrial prairie, or oak savanna are known to survive. A complex and dynamic fragmented mosaic of relatively small plant community remnants, agricultural land, and urban and suburban landscapes remain (Brewer et al. 1969; Chapman 1984; Comer et al. 1995; Hodler et al. 1981).

Important Factors Affecting the Flora. Native Americans through their use of fire had a significant influence on the plant communities observed by the GLO surveyors and by early settlers in Kalamazoo County.

The grasses are supposed to be owing to the fires periodically lighted by the Indians in order to clear their hunting grounds . . . " (Cooper 1848, speaking of Prairie Ronde).

"The prairie . . . seemed wondrously beautiful and grand. It was simply in a state of nature, covered with a pretty rank growth of grass, then [6 November 1831] *dry and sere, no tree except the Big Island Grove ("Island Woods"), and one or two other small groves . . . Early in March the rank growth of last year's grass, dried by the sun and wind, was set on fire, and the whole prairie burned over, leaving it bare and black as midnight. Then in a few days came the beautiful flowers, covering the whole prairie with one uniform kind and color; first, the blue violet* [Viola pedatifida]*, then the purple phlox* [Phlox pilosa]*, and this succeeded by some other color. In July and August a tall, yellow flower, the name of which I do not know* [probably Silphium integrifolium]*, mixed profusely with the tall grass* [probably Andropogon gerardii]*, gave yellow as the predominating color. . . . But all was wild, with a peculiar, rank, sick smell, that even now almost brings back the shivers of the ague* [recurring fever & chills caused by malaria]*."* (Brown, 1881, describing Prairie Ronde and Gourdneck Prairie).

"I went out to Gull Prairie in the spring of [18]*'33 with J. F. Gilkey; the prairie had been burnt over in the fall and the fresh green grass and the thousand wildflowers made it seem like a great garden.* (Turner 1911, describing Gull Prairie).

The effects of the fur trade were also probably significant, not just from the standpoint of manipulating beaver and other animal populations, but also because they potentially affected land use patterns by Native Americans (e.g., during the Iroquois wars).

Changes in the ecology of Kalamazoo County plant communities are ongoing. Exotic plants, insects, fungi, bacteria, etc. continue to have serious consequences for the native flora (known examples are sometimes given in the annotated checklist). Invasion of exotic genetic material may also be an important factor affecting the ecology and evolution of the native flora. Plants that once existed, or currently exist as natives, but specimens of which have been imported from otherwise distant places may potentially contaminate local genotypes (if they exist—in most cases we don't know). These introductions also make it nearly impossible to determine if native genotypes of a species have been extirpated from the county. Several examples include *Bouteloua curtipendula*, *Echinacea purpurea,* and *Silphium terebinthinaceum*.

Clearly, the myriad biotic and abiotic changes that have occurred in Kalamazoo County natural communities over the last several hundred years have much affected the flora. In fact, few pre-European settlement natural communties can be said to persist, and many of the animals with which native plants once interacted have been extirpated or their numbers have changed dramatically.

Future of the Flora. The species richness of the Kalamazoo County flora is largely a result of the interdigitation of numerous and different, species rich plant communities (Figures 4–6), many of which have nearly disappeared. At the time of the GLO surveys (1826–1830), white oak savanna (79,746.8 acres), oak hardwood forest (78,209.1 acres), sugar maple forest (76,236.3 acres), black oak bar-

ren (40,225.2), and terrestrial prairie (more than 21,584 acres) were the most abundant plant communities. Prairie and bur oak savanna are now more or less extinct in Kalamazoo County. Black oak barren and white oak savanna have been reduced to a very few altered and tiny remnants despite once dominating the landscape. Oak hardwood forest and sugar maple forest are now limited to relatively small disturbed remnants that retain only a subset of their presettlement vegetation and structural characteristics.

More than 50% of original wetland acreage has been lost, and much of that which remains is highly fragmented and significantly altered from its pre-European settlement state (P. Comer pers. comm., Comer et al. 1995, pers. obs.). Spatially-explicit, cyclical, and (often) ancient disturbance regimes such as fire, drought, and flooding, have mostly been replaced by relatively novel stochastic disturbances.

Much has been lost, and how long that which remains will persist is unclear. Sprawl in southern Portage, and burgeoning development, especially in Alamo, Kalamazoo, Oshtemo, Richland, and Texas Tps. are claiming the last vestiges of once characteristic, widespread, and diverse plant communities. Too often, previously disturbed properties are left vacant while relatively undisturbed remnants of natural communities are developed, destroying or forever altering the biodiversity intricately associated with them.

The continued loss of native prairie, savanna, and wetland plants through fire suppression, outright habitat destruction, and the perturbation of forested and open wetlands (especially globally rare coastal plain marshes, fens, and floodplain forests) are perhaps the greatest immediate threats to the Kalamazoo County flora. Long-term declines in native plant species richness are apparent at the Hampton Creek Wetlands Complex, in the Sugarloaf Lakes Region (both in the Gourdneck State Game Area), at Camp Custer, and at all other long-studied, and relatively well-protected sites for native plant communities in Kalamazoo County (pers. obs.; C. R. Hanes unpublished data). I am aware of no significant exceptions.

Species that persist as relicts of practically extinct plant communities, and/or do not readily establish outside of former community remnants are those in most immediate danger of local extinction. Some examples of the former include many prairie, savanna, and open oak hardwood forest plants: *Angelica venenosa*, *Asclepias purpurascens, A. viridiflora, Baptisia lactea, Besseya bullii, Eryngium yuccifolium*, *Gaura biennis, Liatris cylindracea, Panicum leibergii, Silene stellata* and *Viola pedatifida,* to name a few. Today these plants mostly persist in marginal habitats such as fencerows, forest edges, overgrown former savanna and prairie, and/or roadsides. Their former prairie, open forest, and savanna habitats have been more or less eliminated (Hanes & Hanes 1947; pers. obs.). Without the habitats and ecological interactions that native plants require for successful growth and reproduction, they cannot persist.

Aggressive native species and invasive exotics pose an additional significant threat to floristic diversity. The diverse native flora of Kalamazoo County is being slowly replaced by a lesser diversity of native and alien species better suited to the current highly fragmented and disturbed landscape. Here, most plants are subjected to a simpler suite of native biotic interactions than they once

were, including potentially fewer arthropod and mammalian herbivores, seed dispersers, pollinators, etc. Exotic plants have clearly altered plant community structure and dynamics.

The native plants of Kalamazoo County do not exist in a vacuum. They require an ecological context that maintains at least some evolutionarily ancient and more or less coevolved interactions, as has been widely known for decades. Without a community of pollinators, seed dispersal agents, herbivores, wildfires, and other biotic and abiotic interactions, native plants are merely curiosities. They may as well be grown in a conservatory.

Clearly, many rare plants continue to decline in Kalamazoo County because the radical interventions their situations require (restoration of prairies and savannas, transplantation of plants persisting in marginal habitats, etc.) have not been forthcoming. Provisions for land planning and land management are much needed. Without ecologically sound land planning and restoration of existing protected habitat, the eventual fate of Kalamazoo County's rare plants seems abundantly clear. Many are destined to follow the former prairies and savannas to local and perhaps even eventual rangewide extinction (no doubt the same processes are occurring elsewhere throughout the ranges of many such species).

Some rare plants remain unprotected because sufficient data are not available to reliably determine their current status. Others are relatively more common elsewhere in Michigan and thus are not afforded protection (despite in many cases only persisting in widely separated, marginal habitats). Clearly, existing legislation alone cannot curb the ongoing decline in native plant species richness in Kalamazoo County and beyond.

Conservation-minded organizations have contributed substantially to the preservation and restoration of the Kalamazoo County flora, and their efforts should be applauded. However, much remains to be done. Numerous existing properties dedicated to the preservation of natural history are in drastic need of management. Some properties have been neglected for so long that some of the natural features they were intended to protect and preserve may be lost forever. Still other sites have long been known as local biodiversity hotspots (the Island Woods, LeFevre Bog, Stadium Drive savanna and wet prairie, Mud Lake Bog, etc.) but remain unprotected. Regardless of the degree of action that seems necessary, halting or even just slowing the decline in native plant species richness in Kalamazoo County is a daunting task. Existing natural areas are mostly too small, too isolated, too altered, and too little managed to provide refuge for most of the rare native flora. Further, the fencerow and RR right-of-way prairie and savanna relicts where so many of our native plants now persist, are not nearly as ecologically viable or economically practical to protect as are extensive, relatively intact Northern Great Lakes wetlands (for example). The magnificent biodiversity of Kalamazoo County is disappearing, and no end is in sight. That this trend is clearly being played out on a much larger scale is even more disheartenting.

The loss is really much greater than just the plants themselves. Clearly, the ecological integrity of the landscape has been compromised, perhaps even thoroughly destroyed, such that without radical intervention much more of the native flora will disappear in the years to come. The thread that once held together the

(A.) *Baptisia lactea,* Rare (B.) *Platanthera ciliaris,* Very rare (C.) *Viola pedata,* Rare (D.) *Liatris cyllindracea,* Very rare (E.) *Cypripedium candidum,* Rare (F.) *Asclepias purpurascens,* last population (G.) *Angelica venenosa,* last population (H.) *Eryngium yuccifolium,* last population (I.) *Lithospermum caroliniense*, Very rare (J.) *Filipendula rubra*, photographed near Battle Creek in Calhoun Co., one population remaining in Kalamazoo County (K.) *Silene stellata,* last population (L.) *Amorpha canescens,* Rare (M.) *Silphium integrifolium,* Rare (N.) *Asclepias viridiflora,* photographed by R. W. Pippen at Hampton Creek ca. 1981, no longer extant at this site, one population remaining.

dynamic and diverse web of life in prairies, oak savannas, and beyond, has deteriorated to the point where there is no longer a viable context for a significant portion of the flora (and much of the rest of the biota).

Relictual plants may persist longer than once wide-ranging native animals such as the Regal Fritillary Butterfly, American Bison, or Greater Prairie-chicken, but taken as a whole, without informed land use planning, active management, and habitat protection, their demise is just as certain (Baker 1983; Brewer 1970). It is unclear exactly how many plant species have so far been eliminated (Tables 3–5), but clearly the fate of many that persist has been sealed. If current trends are any indication of the future, clearly time is running out for many of our remaining native plants and remnant plant communities.

ANNOTATED CHECKLIST OF VASCULAR PLANTS

Pteridophytes

LYCOPODIACEAE **Club Moss Family**

Warren H. Wagner, Jr. annotated specimens of most species, and all hybrids reported here.

Diphasiastrum digitatum (Dill. ex A. Braun) Holub. **Hanes:** *Lycopodium flabelliforme*
Running Pine
Occasional. Rich SUGAR-MAPLE-FOREST and OAK-HARDWOOD-FOREST. Rarely makes cones. Not in Hanes & Hanes (1947).

Diphasiastrum ×habereri (*D. digitatum* × *D. tristachyum*) Rare. Collected from "peat moss" on the border of a BOG in section 11 Texas Tp., and from moist sandy soil in a thicket at Sunset Lake. Last collected 21 August 1976.

Diphasiastrum tristachyum (Pursh) Holub. **Hanes:** *Lycopodium tristachyum*
Rare. OAK-HARDWOOD-FOREST in the south half of the county. Known to hybridize with *D. digitatum* forming the named hybrid *Diphasiastrum ×habereri* (see *D. digitatum*).

Huperzia lucidula (Michaux) Trevisan **Hanes:** *Lycopodium lucidulum*
Shining Club Moss
Occasional. HARDWOOD-SWAMP and RED-MAPLE-SWAMP, primarily in the western half of the county.

Lycopodiella inundata (L.) Holub. **Hanes:** *Lycopodium inundatum*
Bog Club Moss
Very rare. A large colony grows in moist loamy sand bordering a pond in Alamo Tp. Here the plants are associated with *Aletris farinosa, Viola palmata, Viola lanceolata, Viola sagittata, Hypericum prolificum, Lobelia siphilitica*, *Rhynchospora capitellata, Bartonia virginica, Scleria pauciflora,* and young *Quercus velutina*. No other extant sites are known. Collected by the Haneses from COASTAL-PLAIN-MARSH along the shores of Eagle and Pretty Lakes. The current status of the two Hanes sites is uncertain. Should be looked for in moist to wet sandy areas near water, especially at Pretty Lake, the only former site where significant intact habitat remains. Specimens from Eagle Lake and Pretty Lake are close to *L. appressa* (Chapman) Cranfill, but were not annotated by W. H. Wagner, Jr. and thus are maintained under this name.

Lycopodium clavatum L.
Trailing Club Moss
Occasional. SUGAR-MAPLE-FOREST and RED-MAPLE-SWAMP.

Lycopodium dendroideum Michaux **Hanes:** *L. obscurum* var. *dendroideum*
Occasional. OAK-HARDWOOD-FOREST and SUGAR-MAPLE-FOREST.

Lycopodium obscurum L.
Ground Pine
Rare. SUGAR-MAPLE-FOREST and OAK-HARDWOOD-FOREST.

SELAGINELLACEAE **Spike Moss Family**

Selaginella eclipes W. R. Buck. **Hanes:** *S. apoda*
Creeping Selaginella
Common. FEN, SHRUB-CARR, WET-MEADOW, and other alkaline wetlands.

Selaginella rupestris (L.) Spring
Rock Selaginella
Extinct. Collected by the Haneses from BLACK-OAK-BARREN and hillside prairie in the west half of the county. Last collected from "pasturelands" near the city of Kalamazoo by Caroline N. Harvey on 27 July 1939.

ISOËTACEAE **Quillwort Family**

Isoëtes echinospora Durieu. **Hanes:** *I. Braunii*
Quillwort
Rare. Collected by the Haneses (but originally found by H. R. Becker) at McGinnis Lake in sandy SUB-MARSH. The current status of this site is uncertain. Although plants have not been relocated, large areas of suitable habitat remain unsearched. Occasional in SUB-MARSH to about 2 m deep at Pretty Lake, and probably in other sandy-bottomed lakes. Does not appear to tolerate regular recreational disturbance (pers. obs.).

EQUISETACEAE **Horsetail or Scouring Rush Family**

Equisetum arvense L.
Field Horsetail
Common. RR rights-of-way and roadsides, old fields, and other disturbed, open situations.

The hybrid *Equisetum* ×*litorale* (*E. arvense* × *E. fluviatile)* is known from several collections made from throughout the county.

Equisetum fluviatile L.
Swamp Horsetail
Common. FEN, TAMARACK-SWAMP, and EM-MARSH, especially in wet depressions. Known to hybridize with *E. arvense* forming the named hybrid *Equisetum* × *litorale* (see *E. arvense*).

Equisetum hyemale L. **Hanes:** *E. prealtum*
Tall Scouring Rush
Common. Roadsides, RR rights-of-way and numerous other relatively open marginal habitats.

The hybrid *Equisetum* ×*ferrissii* (*E. hyemale* × *E. laevigatum)* is rare throughout. It is usually found in the vicinity of its putative parents on roadsides and in other disturbed situations. The Haneses called this hybrid *E. hyemale* var. *elatum*.

Equisetum laevigatum A. Braun
Smooth Scouring Rush
Occasional. WET-MEADOW, RR rights-of-way, and WET-PRAIRIE, mostly in the south half of the county. Includes *E. kansanum* as given in Hanes & Hanes, 1947.

The hybrid *Equisetum* ×*nelsonii* (*E. laevigatum* × *E. variegatum*) is occasional throughout along lakeshores in EM-MARSH, FEN, and in other wet seepy areas. Called *E. nelsoni* by the Haneses. Also known to hybridize with *E. hyemale* forming the named hybrid *Equisetum* ×*ferrissii* (see *E. hyemale*).

Equisetum palustre L.
Marsh Horsetail
Current status uncertain, very rare if still extant. Known only from collections made by the Haneses near the border between sections 20 and 29 of Portage Tp. ("in and along the side of a small ditch emptying into Portage Creek ¾ mi. E of Hampton Lake"). Last collected at this site on 7 August 1939.

Equisetum scirpoides Michaux
Sedge-like Scouring Rush
Extinct. Last collected by F. W. Rapp in 1936 from along the E shore of Austin Lake in "moist low ground" in an area then dominated by a mosaic of COASTAL-PLAIN-MARSH, open OAK-HARDWOOD-FOREST, sandy WET-PRAIRIE, and oak savanna. No other sites have ever been known. At the extreme SW edge of its known range.

Equisetum sylvaticum L.
Wood Horsetail
Current status uncertain. Collected only by the Haneses from near Portage Creek in section 32 of Brady Tp., from a "RR bank W of Williams, Alamo Tp.", and from the "border of a wooded swamp N of Mud Lake, Pavilion Tp." No fertile specimens known.

OPHIOGLOSSACEAE **Adder's Tongue Family**

Several species are reported here for the first time in Kalamazoo County, based on specimens at WMU annotated by W. H. Wagner, Jr. *Botrychium matricariifolium* (Döll) Braun ex Koch., Daisy-leaf Grape-fern is reported by Brewer (1984) from the MI Central RR right-of-way on the extreme N edge of the former Genesee Prairie. This is however, not a typical habitat for this species which is also usually more northern in range. I have not been able to locate an herbarium specimen, and since *B. matricariifolium* resembles such rarities as *B. campestre* W. H. Wagner & Farrar (a prairie species) and several other relatively rare species of "moonworts," I have decided to withhold listing it in the checklist below until a specimen surfaces, or a new collection is made that will permit definitive identification. I saw one plant that resembled *B. matricariifolium* in 1998 growing beneath *Eupatorium maculatum* in shrubby former WET-MEADOW east of Oakland Dr. in Portage Tp. This specimen was not collected since no other plants were found. I never returned to the site to obtain a photo.

Botrychium dissectum Sprengel
Cut-leaved Grape-fern
Occasional. OAK-HARDWOOD-FOREST and SUGAR-MAPLE-FOREST. *Botrychium dissectum* var. *obliquum* (Oblique Grape Fern) occurs in similar situations, but is less frequently encountered.

Botrychium multifidum (S. G. Gmelin) Ruprecht
Leather Grape-fern
Occasional. SUGAR-MAPLE-FOREST and OAK-HARDWOOD-FOREST.

Botrychium oneidense (Gilbert) House
Blunt-lobe Grape-fern
Current status unknown. Habitat unknown. Several specimens originally determined as *B. multifidum* have been re-identified by W. H. Wagner Jr. as this species. Not in Hanes & Hanes (1947).

Botrychium rugulosum W. H. Wagner
Rugulose Grape-fern
Current status unknown. Habitat unknown. Several specimens originally determined as *B. multifidum* have been re-identified as this species (Wagner & Wagner 1982). Not in Hanes & Hanes (1947).

Botrychium virginianum (L.) Swartz
Rattlesnake-fern
Occasional. OAK-HARDWOOD-FOREST.

Ophioglossum pusillum Raf. **Hanes:** *O. vulgatum*
Common Adder's-tongue
Current status uncertain. Collected by the Haneses from sandy moist to wet situations in the south half of the county (including sandy WET-PRAIRIE), usually near lakes. Not collected or observed since seen by the Haneses on 31 May 1946 "within a few feet of the water on the SE shore of West Lake." West Lake has primarily a sandy substrate and much of its shoreline is former Coastal Plain Marsh and sandy WET-PRAIRIE. Most known sites for this inconspicuous plant (including the aforementioned site) have since suffered mild to severe disturbance. It seems likely however that further searches of known former collection sites will identify extant populations.

DENNSTAEDTIACEAE

Pteridium aquilinum L.
Bracken
Common. Oak savanna, OAK-HARDWOOD-FOREST, dry sandy ecotone, and old fields.

LYGODIACEAE

Lygodium palmatum (Bernh.) Swartz
Climbing Fern
Very rare. Discovered by R. W. Pippen in May 1965 along a trail in the Gourdneck State Game Area (Pippen 1966). Persisting in 1999 despite increasing shade from tree and shrub growth. Associated with *Osmunda cinnamomea*, *O. regalis*, *Pinus banksiana*, *P. sylvestris* (both pines are planted), and *Toxicodendron vernix.* The origin of this plant is unknown. No additional plants have ever been located despite several decades of botanizing in the area by WMU botany courses. This site is substantially disjunct to the north and west of other known occurrences. Not in Hanes & Hanes (1947). Possibly introduced.

DRYOPTERIDACEAE

All hybrids and most species reported here were annotated by W. H. Wagner, Jr.

Athyrium felix-femina (L.) Mertens **Hanes:** *A. angustum*
Lady Fern
Occasional. HARDWOOD-SWAMP, RED-MAPLE-SWAMP, TAMARACK-SWAMP, and relatively wet SUGAR-MAPLE-FOREST. All specimens are of the var. *angustum*.

Athyrium thelypteroides (Michaux) Desv.
Silvery Spleenwort
Occasional. SUGAR-MAPLE-FOREST and RED-MAPLE-SWAMP.

Deparia acrostichoides (Swartz) M. Kato. **Hanes:** *Polystichum acrostichoides*
Christmas Fern
Common. SUGAR-MAPLE-FOREST. The forma *incisum* is known only from SUGAR-MAPLE-FOREST near Paw Paw Lake.

Diplazium pynocarpon (Sprengel) M. Broun. **Hanes:** *Athyrium pynocarpon*
Narrow-leaved Spleenwort
Occasional. Rich SUGAR-MAPLE-FOREST.

Dryopteris celsa (W. Palmer) Knowlton, W. Palmer & Pollard
Log Fern
Rare. HARDWOOD-SWAMP, RED-MAPLE-SWAMP, SUGAR-MAPLE-FOREST (only near swamp forests), and FLOODPLAIN-FOREST. *Dryopteris celsa* is a fertile allotetraploid (*D. goldiana* × *D. ludoviciana*). *Dryopteris celsa* is often associated with *D. cristata, D. goldiana,* and

D. clintoniana. Hybrids involving these and other species are not uncommon. According to W. H. Wagner Jr. (Wagner et al. 1969), *Dryopteris celsa* was once "exceedingly common" on Sugarloaf Island (the area is now occupied by a housing development). Not in Hanes & Hanes (1947).

The hybrids *Dryopteris celsa* × *D. goldiana*, *D. celsa* × *D. cristata*, and *D. celsa* × *D. clintoniana* are also known from Sugarloaf Island. *Dryopteris celsa* × *D. goldiana* and *D. celsa* × *D. cristata* are reported from along Flowerfield Creek in Prairie Ronde Tp. (W. H. Wagner, Jr., MNFI site survey report; Wagner et al. 1969). *Dryopteris* ×*separabilis* (*D. celsa* × *D. intermedia*) is known only from the "Island" woods in Schoolcraft and from near Flowerfield Creek, both in Prairie Ronde Tp. (collected by W. H. Wagner Jr., 5 April 1969 (WMU). The status of these hybrids is unknown. Not in Hanes & Hanes (1947).

Dryopteris clintoniana (D. C. Eaton) Dowell **Hanes:** *Dryopteris cristata* var. *clintoniana*
Clinton's Wood Fern
Rare. HARDWOOD-SWAMP, RED-MAPLE-SWAMP, and SUGAR-MAPLE-FOREST (only near swamp forests). *Dryopteris clintoniana* is an allohexaploid hybrid between *D. cristata* and *D. goldiana*. It will hybridize with several other *Dryopteris* spp. It is often associated with *D. cristata, D. goldiana,* and hybrids involving these and other species.

Dryopteris celsa × *D. clintoniana* is known only from Sugarloaf Island which has since been converted into a residential development. Not in Hanes & Hanes (1947).

Dryopteris cristata (L.) A. Gray
Crested Wood Fern
Common. RED-MAPLE-SWAMP and TAMARACK-SWAMP. Often in *Sphagnum* beneath Tamarack. Known to hybridize with *D. celsa*.

Dryopteris goldiana (Hook.) A. Gray
Goldie's Fern
Occasional. SUGAR-MAPLE-FOREST. Known to hybridize with *D. ludoviciana* forming the named hybrid *Dryopteris celsa*. Will also hybridize with *D. celsa* (see *D. celsa*).

Dryopteris intermedia (Muhl. ex. Willd.) A. Gray
Toothed Wood Fern
Occasional. HARDWOOD-SWAMP and RED-MAPLE-SWAMP. Hybridization is common between this species and other members of the *D. spinulosa* complex. Not in Hanes & Hanes (1947).

The hybrid *Dryopteris* ×*boottii* (*D. cristata* × *D. intermedia)* is known only from HARDWOOD-SWAMP in Prairie Ronde Tp. (collected 5 April 1969 by W. H. Wagner, Jr.). Called *D.* ×*boottii* by the Haneses (1947). Will also hybridize with *D. celsa.* Current status of these hybrids is unknown.

The hybrid *Dryopteris* ×*triploidea* (*D. intermedia* × *D. spinulosa*) is a triploid hybrid known only from specimens collected by W. H. Wagner, Jr. and R. W. Pippen on 3 October 1969 from HARDWOOD-SWAMP and RED-MAPLE-SWAMP in Prairie Ronde Tp., and by W. H. Wagner, Jr. on 20 May 1961 from "shaded rocky areas" in Parchment, Cooper Tp. The current status of these hybrids is unknown. Not in Hanes & Hanes (1947).

Dryopteris marginalis (L.) A. Gray
Marginal Shield Fern
Rare. SUGAR-MAPLE-FOREST and OAK-HARDWOOD-FOREST, usually on sheltered hillsides.

Dryopteris spinulosa (O. F. Muell.) Watt.
Common. SUGAR-MAPLE-FOREST and OAK-HARDWOOD-FOREST.

Matteuccia struthiopteris (L.) Todaro **Hanes:** *Pteritis pensylvanica*
Ostrich Fern
Occasional. FLOODPLAIN-FOREST along the Kalamazoo River. The Haneses also report 2 locations in Brady Tp. The status of the Brady Tp. locations is unknown.

Onoclea sensibilis L.
Sensitive Fern
Common. Wet, open to lightly shaded situations including WET-PRAIRIE, FEN, SHRUB-CARR, and HARDWOOD-SWAMP.

Phegopteris hexagonoptera (Michaux) Fée **Hanes:** *Dryopteris hexagonoptera*
Broad Beech Fern
Current status uncertain. SUGAR-MAPLE-FOREST.

OSMUNDACEAE

Osmunda cinnamomea L.
Cinnamon Fern
Common. Shady, wet, usually acid situations including HARDWOOD-SWAMP, SHRUB-CARR, TAMARACK-SWAMP, BOG, and RED-MAPLE-SWAMP.

Osmunda claytoniana L.
Interrupted Fern
Rare. Open HARDWOOD-SWAMP and poorly-drained SUGAR-MAPLE-FOREST, usually near lakes. Rather local. The distribution of this species in Kalamazoo County is peculiar. Most apparently suitable sites (habitats resembling stations where the plant is known to grow) do not support it.

Osmunda regalis L.
Royal Fern
Common. HARDWOOD-SWAMP, RED-MAPLE-SWAMP, FLOODPLAIN-FOREST, BOG, FEN, and SHRUB-CARR. All of our specimens are of the var. *spectabilis*.

PTERIDACEAE

All hybrids and most species reported here were annotated by W. H. Wagner, Jr.

Adiantum pedatum L.
Maidenhair Fern
Occasional. Sheltered hillsides, usually near streams in SUGAR-MAPLE-FOREST and OAK-HARDWOOD-FOREST.

Asplenium platyneuron (L.) Britton, Sterns, & Poggenburg
Common. Dry to moist disturbed situations, especially beneath shrubs on roadsides, and in old fields. Widely established. Not in Hanes & Hanes (1947).

Cystopteris bulbifera L. Bernh.
Bulblet Bladder Fern
Current status unknown. Reported by the Haneses to grow on limestone rocks in sections 12 and 15 of Charleston Tp., and section 25 of Comstock Tp.

Cystopteris fragilis L. Bernh.
Brittle Fern
Occasional. Wooded hillsides near rivers or streams, especially in OAK-HARDWOOD-FOREST, and SUGAR-MAPLE-FOREST, but also sometimes found in swamp forests.

Cystopteris protrusa (Weatherby) Blasdell **Hanes:** *C. fragilis* var. *protrusa*
Southern Bladder Fern
Current status unknown. Collected by the Haneses from SUGAR-MAPLE-FOREST and rich HARDWOOD-SWAMP. Last collected in 1965 from SUGAR-MAPLE-FOREST (F. W. Rapp's woods), 6 mi. E of Vicksburg.

Cystopteris tenuis (Michaux) Desvaux **Hanes:** *C. fragilis* var. *mackayii*
Current status unknown. Collected by the Haneses from steep hillsides in SUGAR-MAPLE-FOR-

EST near the Kalamazoo River and near smaller waterways and ditches, mostly in the north half of the county.

Woodwardia virginica (L.) Sm.
Virginia Chain Fern
Common. BOG.

THELYPTERIDACEAE

Thelypteris noveboracensis (L.) Nieuwland **Hanes:** *Dryopteris noveboracensis*
New York Fern
Occasional. Relatively open situations in hilly OAK-HARDWOOD-FOREST, usually adjacent to FEN or BOG.

Thelypteris palustris Schott **Hanes:** *Dryopteris thelypteris*
Marsh Fern
Common. BOG, FEN, WET-PRAIRIE, WET-MEADOW, and other relatively open swampy situations. All of our specimens are var. *pubescens*.

Gymnosperms

TAXACEAE **Yew Family**

Taxus canadensis Marsh.
Yew
Rare. A single small bush was found in a HARDWOOD-SWAMP in Portage Tp. in fall 1999. May have escaped from cultivation. Not in Hanes & Hanes (1947).

GINKGOACEAE

Ginkgo biloba L.
Ginkgo
Rare. An escape from cultivation in gardens and hedges near the married housing complexes at WMU (pers. obs. 1995). All specimens I have found grew near a single planted female tree, and none exceeded 15 cm tall. Not in Hanes & Hanes (1947).

PINACEAE **Pine Family**

Abies balsamea (L.) Miller
Balsam Fir
Rare outside of cultivation. Only locally established. I first observed this species outside of cultivation at Bishop's Bog (Portage Tp.) in 1995. No trees with more than seven whorls of branches were found in a 1998 survey I made of this site. One small seedling (approx. 15 cm tall) was found on a steep, dry, gravelly hillside overgrown with brush on the WMU campus in 1996. Not in Hanes & Hanes (1947).

Larix laricina (DuRoi) K. Koch
Larch; Tamarack
Common. TAMARACK-SWAMP, RED-MAPLE-SWAMP, FEN, and BOG. Despite a considerable loss in total acreage of TAMARACK-SWAMP and other wetlands, tamarack is still locally abundant in swampy situations throughout the county. The Haneses (1947) note that "many stands are dying out due to change of water level or to insect injury."

Pinus banksiana Lamb.
Jack Pine
Locally established. A single population of about fifty small trees grows near several larger planted trees in a sandy former BLACK-OAK-BARREN in Alamo Tp. known by the Haneses as "Cold Springs." A few trees also appear to be growing outside of cultivation near planted trees along a power line ROW near Hampton Lake (Portage Tp.). Not in Hanes & Hanes (1947).

Pinus laricio Poir. **Hanes:** *P. nigra*
Austrian Pine
Collected in Camp Custer by H. R. Becker. Included in the Haneses' 1947 flora, but they were not sure if the one known specimen was planted. Not otherwise known outside of cultivation. The only specimen is of the var. *austriaca*.

Pinus strobus L.
White Pine
Occasional as a native tree, primarily in the west half of the county in RED-MAPLE-SWAMP, BOG, and TAMARACK-SWAMP. A few old-growth trees persist alongside many younger individuals in RED-MAPLE-SWAMP west and north of Sugarloaf Island and near Goose Lake. Scattered individuals and small populations of relatively young trees can be found throughout the county, typically in dry ecotonal habitats and waste ground, usually on sandy substrates, and more often than not, near mature planted trees. Forest and wetland plant communities with white pine were rare here even before settlement. One of the best remaining examples of RED-MAPLE-SWAMP with white pine is located on private property just north of Sugarloaf Lake on the border of Mud Lake. The original stand of White Pine that once occurred here was mostly cut in the winter of 1900 (Haneses, unpublished notes), but has recovered impressively.

Pinus sylvestris L.
Scotch Pine
First collected by Basil Stergios in 1969 near the Kellogg Biological Station in an old field where it was thought to be an escape from cultivation (MSC). Now rare throughout in disturbed situations where its status (planted/escaped) is often unclear. Not in Hanes & Hanes (1947).

Tsuga canadensis (L.) Carr.
Hemlock
Extinct as a native species. A single specimen, then 18 inches in diameter was known from the edge of a "swamp" in section 20 of Prairie Ronde Tp. (last noted by the Haneses in 1947). The Haneses (1947) note that "in 1945 we were told by Grant Shutes, who was 77 years of age, that he had known this tree during his whole lifetime." This tree has not been relocated despite several attempts, and is thought to have since died. No other native examples of the species have ever been found in Kalamazoo County. A few young trees have been planted in a disturbed SUGAR-MAPLE-FOREST near Comstock.

CUPRESSACEAE **Cypress Family**

Juniperus communis L.
Common or Ground Juniper
Occasional. Mildly alkaline situations along roadsides, RR rights-of-way, and in disturbed OAK-HARDWOOD-FOREST.

Juniperus virginiana L.
Red-cedar
Rare. RED-MAPLE-SWAMP, TAMARACK-SWAMP, and FEN. Usually only one or a few trees are found at a given site, but locally in Charleston Tp. it forms nearly monospecific stands in wet organic muck.

Monocotyledons

TYPHACEAE **Cat-tail Family**

Typha angustifolia L.
Narrow-leaved Cat-tail
Common. EM-MARSH. May be a mild halophyte along roadsides, or at least tolerates mild salinity and eutrophication as does the next species and their hybrid. Widely established.

The hybrid *Typha ×glauca* (*T. angustifolia* × *T. latifolia*) is rare throughout (probably overlooked) in EM-MARSH, WET-MEADOW, FEN, and in roadside ditches. The Haneses called this hybrid *T. angustifolia* var. *elongata.*

Typha latifolia L.
Common Cat-tail
Common. Almost all relatively stagnant moist to inundated and relatively open situations. Like *T. angustifolia* it may be a mild halophyte and seems to thrive under eutrophic conditions. Known to hybridize with *T. angustifolia* forming the named hybrid *Typha ×glauca* (see *T. angustifolia*).

SPARGANIACEAE **Bur-reed Family**

Sparganium americanum Nutt.
Occasional. SUB-MARSH of small lakes.

Sparganium chlorocarpum Rydb.
Occasional. SUB-MARSH, EM-MARSH, and SHRUB-SWAMP associated with lakes and streams, especially at their inlets and outlets.

Sparganium eurycarpum Engelm.
Occasional. SUB-MARSH and EM-MARSH at the borders of ponds, streams, and the Kalamazoo River.

Sparganium fluctuans (Morong) Robinson
Current status uncertain, very rare if still extant. Collected by the Haneses only from a "marsh" in "the E Lake of Three Lakes, Richland Tp."

Sparganium minimum (Hartman) Fries
Current status uncertain, very rare if still extant. Collected by the Haneses from muddy EM-MARSH in a small pond in Texas Tp. (Hanes 1943). No other sites or collections are known.

POTAMOGETONACEAE **Pondweed Family**

Very few *Potamogeton* were sought in the field during the course of this study. I have thus relied heavily on specimens annotated by E. G. Voss to document our many species. Relatively few collections of *Potamogeton* have been made in Kalamazoo County since publication of the Haneses' (1947) flora, so the treatment for most species is necessarily brief and generally lacking contemporary data describing frequency and distribution. Habitat data have sometimes been gleaned from label data on old herbarium specimens. *Potamogeton vaseyi* is not included here because the only known records are of specimens at MSC and MICH whose annotations read "lake near Hickory Corners," suggesting to me that they were probably collected in Barry County.

Potamogeton amplifolius Tuckerman
Common. SUB-MARSH of lakes throughout.

Potamogeton berchtoldii Fieber
Current status uncertain. SUB-MARSH of sandy-bottomed lakes.

Potamogeton crispus L.
Common. SUB-MARSH of lakes, streams, and the Kalamazoo River.

Potamogeton epihydrus Raf.
Current status uncertain. Reportedly once "common" in SUB-MARSH at Thrall Lake, Brady Tp. (Hanes & Hanes 1947).

Potamogeton filiformis Pers.
Current status unknown. SUB-MARSH. Not in Hanes & Hanes (1947).

Potamogeton foliosus Raf.
Current status uncertain. SUB-MARSH of streams and lakes.

Potamogeton friesii Rupr.
Current status uncertain. Collected by the Haneses from SUB-MARSH in Barton Lake Creek.

Potamogeton gramineus L.
Occasional. Lakes with sandy bottoms, mostly in the western half of the county. Hybrids between this species and *P. illinoensis* are known from Kalamazoo County (Voss 1972).

Potamogeton illinoensis Morong
Current status uncertain. SUB-MARSH of lakes and streams.

Potamogeton natans L.
Occasional. SUB-MARSH of the Kalamazoo River, lakes, and streams.

Potamogeton nodosus Poiret
Current status unknown. Collected throughout by the Haneses from SUB-MARSH in the Kalamazoo River, lakes, and streams.

Potamogeton oakesianus Robbins
Current status uncertain. Collected by the Haneses from BOG, lakes, and streams. Usually grows on "false-bottoms."

Potamogeton pectinatus L.
Sago Pondweed
Common. SUB-MARSH in lakes and streams.

Potamogeton praelongus Wulfen
Current status uncertain. Collected throughout by the Haneses from SUB-MARSH in lakes.

Potamogeton pusillus L.
Current status unknown. Collected by the Haneses from SUB-MARSH in ponds and streams in the southwestern quarter of the county.

Potamogeton richardsonii (Benn.) Rydb.
Current status uncertain, very rare if still extant. Collected by J. J. Jackson on 5 July 1916 at Gull Lake, growing in "standing, open water . . . ." (OLV). Two other collections are known from Gull Lake, one from 1926, and another from 1941. The 1941 collection notes that the plants occurred in 3–8 feet of water over a "marl-muck" substrate (MSC). Not in Hanes & Hanes (1947).

Potamogeton robbinsii Oakes
Current status unknown. Collected by the Haneses from SUB-MARSH in Austin and Long Lakes.

Potamogeton strictifolius Bennett
Current status unknown. Collected by the Haneses from SUB-MARSH in Campbell and Sugarloaf Lakes.

Potamogeton vaginatus Turcz.
Current status unknown. SUB-MARSH. Not in Hanes & Hanes (1947).

Potamogeton zosteriformis Fern.
Common. Shallow to deep water in lakes, streams, ponds, and the Kalamazoo River.

NAJADACEAE **Naiad Family**

Najas flexilis (Willd.) Rostk. & Schmidt
Common. SUB-MARSH of lakes and streams.

Najas gracillima (A. Br.) Magnus
Occasional. SUB-MARSH of mostly sand and gravel bottomed lakes. Not native.

Najas guadalupensis (Sprengel) Magnus
Current status unknown. Collected by the Haneses from SUB-MARSH in mostly sand and gravel bottomed lakes. Some sterile specimens resemble *N. olivacea*. All reports of *N. olivacea* from Kalamazoo County probably refer to this species (Voss 1972).

Najas marina L.
Current status unknown. First collected by M. McCann in 1976 from Asylum Lake where it is now occasional in SUB-MARSH near the outlet. Collected by T. D. Trana in 1993 from wet mucky SUB-MARSH in a pond at Fort Custer (MICH). Not native. Not in Hanes & Hanes (1947).

JUNCAGINACEAE **Arrow-grass Family**

Scheuchzeria palustris L.
Very rare. Known only from Bishop's Bog where it grows in wet open *Sphagnum*. Sterile plants are abundant, but relatively few fertile plants have been seen in countless visits to the site (1994–2002). Interestingly, no plants are known from the nearby West Lake Bog. Not known elsewhere in Kalamazoo County.

Triglochin maritimum L. **HANES:** *T. maritima*
Occasional. FEN sedge meadow.

Triglochin palustre L. **HANES:** *T. palustris*
Rare. Wet mucky lakeshores, often on sedge "hummocks" (but not usually *Sphagnum*) near open water. Often associated with *Liparis loeselii.*

ALISMATACEAE **Water-plantain Family**

Alisma plantago-aquatica L. **Hanes:** *A. subcordatum* & *A. trivale*
Water-plantain
Occasional. WET-MEADOW, SHRUB-SWAMP, and EM-MARSH associated with ponds, lakes, and ditches.

Sagittaria cuneata Sheldon
Wapato; Duck-potato
Current status uncertain. EM-MARSH. Several Hanes specimens of this species were long mistaken for *S. graminea*.

Sagittaria graminea Michaux
Current status uncertain. SUB-MARSH and EM-MARSH in lakes, mostly in the southern half of the county (See *S. cuneata*).

Sagittaria latifolia Willd.
Wapato; Duck-potato
Common. SHRUB-SWAMP, SUB-MARSH, EM-MARSH, and WET-MEADOW associated with ponds, lakes, streams, and ditches.

Sagittaria rigida Michaux
Occasional. SUB-MARSH and EM-MARSH of sandy-bottomed lakes in the western half of the county.

HYDROCHARITACEAE **Frog's-bit Family**

Elodea canadensis Michaux **Hanes:** *Anacharis canadensis*
Common. SUB-MARSH in (usually) marly lakes and streams.

Elodea nuttallii (Planchon) St. John **Hanes:** *Anacharis occidentalis*
Occasional. SUB-MARSH in lakes and streams.

Vallisneria americana Michaux
Tape-grass; Wild-celery
Occasional. SUB-MARSH in the Kalamazoo River, lakes, and streams. Apparently most frequent in the eastern half of the county.

GRAMINEAE (POACEAE) Hanes: GRAMINEAE **Grass Family**

This is a large and diverse family in Kalamazoo County. Several species are reported here based on annotations made to specimens in the WMU Hanes herbarium and elsewhere by E. G. Voss and mapped in Volume I of Michigan Flora (1972).

Agropyron repens (L.) Beauv.
Quack Grass
Common. Lawns, cultivated fields, and roadsides.

Agropyron smithii Rydb.
Bluestem
Current status uncertain. Collected from along roadsides and RR rights-of-way. Locally established.

Agropyron trachycaulum (Link) Malte
Wheatgrass
Current status uncertain. WET-MEADOW, HARDWOOD-SWAMP, and roadsides.

Agrostis gigantea Roth
Redtop
Occasional. RR rights-of-way, roadsides, and old fields. Widely established.

Agrostis hyemalis (Walter) BSP. **Hanes:** *A. scabra*
Ticklegrass
First reported in Kalamazoo County from Schoolcraft Tp. in 1993 where it was found in fields and moist open disturbed ground. It is now an occasional weed in Schoolcraft Tp., and may be overlooked elsewhere in the county (MICH). Not native.

Agrostis perennans (Walter) Tuckerman
Autumn or Upland Bent
Current status uncertain. Dry, sandy, disturbed situations. Not native.

Agrostis stolonifera L. **Hanes:** Includes *A. palustris* & *A. alba*
Creeping Bent
Current status unknown. First collected on 7 July 1934 from "marshes" in section 20 of Portage Tp. Later collected in Alamo Tp. Few collections are known. May be at least partly native here (Voss 1972).

Alopecurus aequalis Sobol
Current status unknown. First collected by the Haneses on 3 June 1934 in section 22 of Schoolcraft Tp. from "marsh." The Haneses made another collection in 1942 but no additional specimens are known. Not native.

Alopecurus carolinianus Walter
Current status unknown. First collected by the Haneses in May 1934. Several collections thereafter are from "marshes" and "low ground" in the vicinity of Schoolcraft. Last collected in 1939. Probably adventive.

Alopecurus pratensis L.
Current status unknown. Known from one collection made by the Haneses and H. R. Becker in 1937 from a field on Becker's farm in Charleston Tp. Not native.

Andropogon gerardii Vitman
Big Bluestem; Turkeyfoot
Occasional. Roadsides and RR rights-of-way, in prairie and savanna cemeteries, and in TERRESTRIAL-PRAIRIE, WET-PRAIRIE, FEN, WHITE-OAK-SAVANNA, and BUR-OAK-SAVANNA.

Andropogon scoparius Michaux **Hanes:** *Schizachyrium scoparium*
Little Bluestem
Common. Roadsides and RR rights-of-way, dry to dry-mesic remnant TERRESTRIAL-PRAIRIE, WHITE-OAK-SAVANNA, and BLACK-OAK-BARREN. Sometimes a local component of prairie-FEN meadow.

Andropogon virginicus L.
Broom-sedge
Occasional. Sandy lakeshores including COASTAL-PLAIN-MARSH.

Anthoxanthum odoratum L.
Sweet Vernal Grass
Current status unknown. Collected by the Haneses from the edge of a woods SE of Sugarloaf Lake in section 4 of Schoolcraft Tp. Not native.

Aristida basiramea Vasey
Forked Triple-awned Grass
Occasional. Sandy soil of BLACK-OAK-BARREN, and other dry, sandy open situations, especially old fields (Hermann 1936). Probably adventive.

Aristida dichotoma Michaux
Poverty Grass
Extinct. Collected only by the Haneses from a "sterile gravelly field" in section 16 of Charleston Tp. (Hermann 1936). Possibly adventive.

Aristida necopina Shinners **Hanes:** *A. intermedia*
Current status uncertain, very rare if still extant. First collected by the Haneses 1 September 1942 from a sandy old field in section 8 of Brady Tp. Possibly adventive (Hanes 1945b).

Aristida oligantha Michaux
Prairie Triple-awned Grass
Occasional. RR rights-of-way and other dry, sandy situations including old fields and disturbed BLACK-OAK-BARREN. Probably adventive.

Aristida purpurascens Poiret
Arrow Grass
Common. BLACK-OAK-BARREN and other dry and sandy disturbed situations. Possibly adventive.

Arrhenatherum elatius (L.) Presl
Tall Oatgrass
Current status unknown. Roadsides. Known only from the southwest quarter of the county. Not native.

Avena sativa L.
Oats
Occasional. An escape from cultivation along RR rights-of-way and roadsides mostly in the southwest quarter of the county.

Bouteloua curtipendula (Michaux) Torrey
Grama Grass
Current status as a native species uncertain. Very rare if still extant. Collected by the Haneses from a relatively open former hillside WHITE-OAK-SAVANNA (hillside prairie) near Potter Lake (some labels read Potter's Lake), in Climax Tp. First collected at this site by L. A. Kenoyer in the early 1900s, where he noted that it was "common on shores and hills." Also collected by the Haneses from just a few hundred meters to the north of Potter Lake, on the south shore of McGinnis Lake. These sites are now dominated by OAK-HARDWOOD-FOREST, and most of the few remaining openings have been colonized by exotic shrubs and young native trees. I have not found any potentially native specimens in several years of searching. Collected by the first botanical survey at Grand Prairie. In-

troduced specimens grow in wildflower plantings at the intersection of Oakland Dr. with I-94 and in several places along I-94 near the E edge of the county (1997).

Brachyelytrum erectum (Roth) Beauv.
Occasional. SUGAR-MAPLE-FOREST.

Bromus briziformis Fischer & Meyer
Quake Grass
Current status unknown. Roadsides. Not native.

Bromus ciliatus L.
Fringed Brome
Occasional. Open situations in TAMARACK-SWAMP, WET-MEADOW, FEN, and BOG.

Bromus commutatus Schrader
Hairy Chess
Current status unknown. Collected by the Haneses from roadsides in the southwestern quarter of the county. Not native.

Bromus inermis Leysser
Smooth Brome
Once "infrequent" near Schoolcraft (Hanes & Hanes 1947). Now common throughout along roadsides, RR rights-of-way, and in other moist to wet open situations. Widely established.

Bromus japonicus Murray
Japanese Brome
Common. RR rights-of-way and old fields. Widely established.

Bromus kalmii Gray
Kalm's Chess
Extinct. Collected by the Haneses from a roadside SE of Alamo. May have been introduced, or a relict of former oak savanna or prairie.

Bromus latiglumis (Shear) Hitchc.
Current status unknown. Collected by the Haneses from WET-MEADOW and "swamps" where it was "local."

Bromus mollis L.
Soft Chess
Occasional. Roadsides and old fields. Widely established.

Bromus pubescens Willd. **Hanes:** *B. purgans*
Canada Brome
Occasional. SUGAR-MAPLE-FOREST and OAK-HARDWOOD-FOREST.

Bromus secalinus L.
Cheat; Chess
Common. Dry, often sandy terrestrial situations, especially roadsides and RR rights-of-way. Widely established.

Bromus squarrosus L.
Corn Brome
Current status unknown. Collected by the Haneses from a RR right-of-way 2 mi. N of Schoolcraft where first noticed by F. W. Rapp in 1938. Not native.

Bromus tectorum L.
Downy Chess
Occasional. Dry, open terrestrial situations. Not native.

Calamagrostis canadensis (Michaux) Beauv.
Blue-joint
Common. FEN, WET-MEADOW, COASTAL-PLAIN-MARSH, WET-PRAIRIE, and other moist to wet open situations.

Calamagrostis inexpansa Gray
Bog Reed Grass
Current status unknown. Collected by the Haneses from "a swamp along the Grand Trunk railway 3.5 miles SW of Schoolcraft," from the "S shore of Blue Lake" in section 34 of Charleston Tp., and collected by F. W. Rapp "in a swamp SW of Vicksburg."

Calamagrostis stricta (Timm) Koeler **Hanes:** *C. neglecta*
Rare. FEN and less frequently in seepage BOG (in fen-like microclimates) especially in the vicinity of the Sugarloaf Lakes and Hampton Creek. Usually growing in muck at stream edges, or in open FEN sedge meadow. A large and perennially very wet FEN sedge meadow near Sugarloaf Lake is covered with a dense growth of this species over several acres (last observed in 1999). Also reported by the Haneses from "swamps" and "shores" at several other rather widely scattered locations.

Calamovilfa longifolia (Hooker) Scribner
Long-leaved Reed Grass
Current status uncertain, very rare if still extant. Collected by the Haneses from a RR right-of-way 6 mi. SW of Schoolcraft (Hanes 1945b). Possibly adventive.

Cenchrus longispinus (Hackel) Fern.
Sandbur; Sandspur
Rare. Sandy, open, disturbed ground including roadsides, lawns, and lakeshores. Not native.

Cinna arundinacea L.
Wood Reed Grass
Occasional. HARDWOOD-SWAMP and RED-MAPLE-SWAMP.

Cynodon dactylon (L.) Pers.
Bermuda Grass
Common. Grows in a diversity of disturbed open situations. Widely established.

Cynosurus cristatus L.
Crested Dog's-tail Grass
Not known since collected by L. A. Kenoyer in 1929 from a "grass lawn" at Ramona Park, Long Lake. Not native.

Cynosurus echinatus L.
Current status unknown. First collected in 1967 by S. Stephenson where "well-established" on a dry, W-facing slope near the N edge of Wintergreen Lake in the Kellogg Bird Sanctuary (MSC). Also scattered along a nearby road and marsh edge (Stephenson 1967). Not native. Only collection known from Michigan. Not in Hanes & Hanes (1947).

Dactylis glomerata L.
Orchard Grass
Common. Moist to wet open situations. Widely established.

Danthonia spicata (L.) R. & S.
Poverty Grass; Oatgrass
Current status uncertain. Disturbed, dry, sandy soil. May have once occurred in TERRESTRIAL-PRAIRIE.

Deschampsia cespitosa (L.) Beauv.
Tufted Hair Grass
Rare. Marly lakeshores.

Diarrhena americana Beauv.
Current status uncertain, very rare if still extant. Collected only by the Haneses from E of Galesburg near the Kalamazoo River "in small colonies in moderately moist soil" in FLOODPLAIN-FOREST. Not since known from Kalamazoo County.

Digitaria filiformis (L.) Koeler
Current status uncertain, very rare if still extant. Known from a single collection made by the first botanical survey at Grand Prairie (TEX). This specimen is listed in unpublished notes prepared by R. McVaugh on the first botanical survery collections. Although I have not seen the specimen, I accept it here based upon his determination. There is a rather poor specimen in the A. C. Roberts collection (KVM) that may belong to this species. Not in Hanes & Hanes (1947).

Digitaria ischaemum (Schreber) Muhl.
Smooth Crab Grass
Occasional. Open disturbed situations. Widely established.

Digitaria sanguinalis (L.) Scop.
Large Crab Grass
Common. Lawns, cultivated fields, and roadsides. Widely established.

Echinochloa crusgalli (L.) Beauv.
Barnyard Grass
Common. Lawns, cultivated fields, and roadsides. Widely established.

Echinochloa muricata (Beauv.) Fern. **Hanes:** *E. pungens*
Wild Millet
Current status unknown. Collected by the Haneses from wet ground at lake edges in EM-MARSH?, and from dry exposed pond basins.

Echinochloa walteri (Pursh) Heller
Current status uncertain. Collected by the Haneses from along creeks and the Kalamazoo River.

Eleusine indica (L.) Gaertner
Goose Grass
Occasional. Open waste ground and lawns. Not native.

Elymus canadensis L.
Nodding Wild Rye
Occasional. RR rights-of-way and roadsides, especially in remnant TERRESTRIAL-PRAIRIE, and near lakeshores. Mostly in the southwest quarter of the county. Voss (1972) cites a specimen from Kalamazoo County with "glabrous, or merely scabrous lemnas" [f. *glaucifolius*].

Elymus riparius Wieg.
River-bank Wild Rye
Occasional. Known primarily from along the Kalamazoo River E of Kalamazoo in FLOODPLAIN-FOREST and associated WET-MEADOW.

Elymus villosus Willd.
Slender Wild Rye
Occasional. SUGAR-MAPLE-FOREST and OAK-HARDWOOD-FOREST. May once have occurred in oak savanna.

Elymus virginicus L.
Wild Rye
Occasional. HARDWOOD-SWAMP, SUGAR-MAPLE-FOREST, and FLOODPLAIN-FOREST.

Eragrostis cilianensis (All.) Mosher
Stink Grass
Current status unknown. Lawns, fields, and roadsides. Not native.

Eragrostis frankii Steudel
Frank's Lovegrass
Current status uncertain. Collected by the Haneses from "mud flats" along the Kalamazoo River, and from "moist open ground" essentially throughout.

Eragrostis hypnoides (Lam.) BSP.
Creeping Eragrostis
Current status unknown. Collected by the Haneses from along "gravelly or muddy shores" of the Kalamazoo River, and from near "creeks."

Eragrostis pectinacea (Michaux) Nees
Small Tufted Lovegrass
Current status uncertain. Disturbed open situations.

Eragrostis poaeoides R. & S. **Hanes:** *E. minor*
Current status unknown. RR rights-of-way and old fields in sandy soil. Not native.

Eragrostis spectabilis (Pursh) Steudel
Tumble Grass
Occasional. Mostly in the western half of the county along RR rights-of-way and in disturbed former BLACK-OAK-BARREN.

Festuca obtusa Biehler
Nodding Fescue
Occasional. All kinds of terrestrial forests.

Festuca octoflora Walter **Hanes:** *Vulpia octoflora*
Six-weeks Fescue
Occasional. Open situations with dry soil.

Festuca ovina L.
Sheep Fescue
Occasional. Dry, sandy old fields and other disturbed situations. Not native.

Festuca pratensis Hudson **Hanes:** *F. elatior*
Meadow Fescue
Common. Roadsides, fields, and other disturbed situations. Widely established.

Festuca rubra L.
Red Fescue
Occasional. Lawns, old fields, and a diversity of other open, usually disturbed situations. Native and introduced plants occur here.

Glyceria acutiflora Torrey
Sharp-scaled Manna Grass
Current status uncertain, very rare if still extant. Known from collections made by the Haneses from "wet soil along an old ditch" in the southwest quarter of section 22 Schoolcraft Tp. (Hermann 1936). Also collected by F. W. Rapp in "the Vicksburg drain E of the railroad tracks in section 18 of Brady Tp." Possibly adventive.

Glyceria borealis (Nash) Batchelder
Northern Manna Grass
Occasional. TAMARACK-SWAMP and EM-MARSH.

Glyceria canadensis (Michaux) Trin.
Rattlesnake Grass
Occasional. FEN, WET-MEADOW, open RED-MAPLE-SWAMP, and TAMARACK-SWAMP.

Glyceria grandis S. Watson
Reed Manna Grass
Current status uncertain. Reported by the Haneses only from a collection made by H. R. Becker in section 30 of Charleston Tp. Keough & Pippen (1981) report this species as "frequent" in a BOG S of Centre St. E of US 131 in the Gourdneck State Game Area, where it was associated with *Aronia prunifolia, Carex oligosperma, Dulichium arundinaceum*, and *Woodwardia virginica*. I have not seen a herbarium specimen from this site.

Glyceria septentrionalis Hitchc.
Floating Manna Grass
Current status uncertain. EM-MARSH and SHRUB-SWAMP.

Glyceria striata (Lam.) Hitchc.
Fowl Manna Grass
Occasional. SUGAR-MAPLE-FOREST, HARDWOOD-SWAMP, RED-MAPLE-SWAMP, and FLOODPLAIN-FOREST.

Hierochloë odorata (L.) Beauv.
Sweet Grass
Occasional. FEN.

Holcus lanatus L.
Velvet Grass
Current status unknown. Collected by the Haneses from wet woods and marsh edges, mostly in the SW ¼ of the county (Hanes 1940). Not native.

Hordeum jubatum L.
Squirrel-tail Grass
Common. Roadsides and old fields. Not native.

Hystrix patula Moench
Bottlebrush Grass
Common. Terrestrial forests, especially SUGAR-MAPLE-FOREST.

Leersia oryzoides (L.) Sw.
Cut Grass
Occasional. SHRUB-SWAMP, WET-MEADOW, FEN, EM-MARSH, and openings in TAMARACK-SWAMP.

Leersia virginica Willd.
White Grass
Occasional. HARDWOOD-SWAMP and SUGAR-MAPLE-FOREST.

Leptochloa fascicularis (Lam.) Gray
Sprangletop; Salt Meadow Grass
Current status unknown. First collected in 1966 from "recently disturbed ground" in a plantation between 42nd St. and Augusta Crk. in the Kellogg Forest (MSC) (Stephenson 1967). Not native. Not in Hanes & Hanes (1947).

Leptoloma cognatum (Schultes) Chase
Fall Witch Grass
Occasional. Dry sandy situations along roadsides and RR rights-of-way, and in old fields.

Lolium perenne L.
Ryegrass
Widely grown as a lawn grass and escaped to roadsides and other disturbed situations throughout the county. Not native.

Milium effusum L.
Millet Grass
Occasional. HARDWOOD-SWAMP, RED-MAPLE-SWAMP, and TAMARACK-SWAMP.

Muhlenbergia frondosa (Poiret) Fern.
Occasional. Diverse open situations.

Muhlenbergia glomerata (Willd.) Trin.
Marsh Wild-timothy
Occasional. FEN, WET-PRAIRIE, WET-MEADOW, RED-MAPLE-SWAMP, and TAMARACK-SWAMP.

Muhlenbergia mexicana (L.) Trin.
Common. FEN and RED-MAPLE-SWAMP.

Muhlenbergia racemosa (Michaux) BSP.
Current status unknown. First collected by the Haneses in 1944 from dry soil along a RR right-of-way in section 21 of Schoolcraft Tp. Adventive.

Muhlenbergia richardsonis (Trin.) Rydb.
Current status uncertain, very rare if still extant. Known only from "dense clumps," often on ant mounds, in a streamside FEN two mi. E of Alamo in section 24 of Alamo Tp. First collected at this site by the Haneses in 1938 (Hanes 1939). Reportedly persisted at least until the early 1970s (R. W. Pippen pers. comm.). I have not been able to find it in several years of searching this relatively small site (1996–2002). Much of the formerly species-rich FEN meadow is now overgrown with SHRUB-CARR. Several other prairie FEN species, including *Arnoglossum plantagineum* and *Sorghastrum nutans* have also disappeared from this site in the last 20 years or so (R. W. Pippen pers. comm. 1997).

Muhlenbergia schreberi J. F. Gmelin
Nimblewill
Current status uncertain. Known from diverse terrestrial situations.

Muhlenbergia sylvatica Torrey
Current status unknown. Collected by the Haneses from "swamps" around Gourdneck, Hampton, Paw Paw, and Sugarloaf Lakes, and "near Spring Brook."

Muhlenbergia tenuiflora (Willd.) BSP.
Current status uncertain. Collected by the Haneses from a "hillside" in section 32 of Texas Tp., and by F. W. Rapp from his SUGAR-MAPLE-FOREST E of Vicksburg.

Oryzopsis racemosa (Sm.) Hitchc.
Black-fruited Rice Grass
Current status uncertain. Collected by the Haneses from "hilly woods" E of Galesburg near the Kalamazoo River where it was "scarce," and from the N border of section 25 of Charleston Tp.

Panicum boreale Nash
Northern Panic Grass
Current status unknown. Collected by the Haneses from moist to wet depressions near Sugarloaf Lake.

Panicum calliphyllum Ashe
Current status uncertain. Not recently collected or observed, and clearly very rare if still extant. Collected by the Haneses from an "oak and hickory wood" in section 18 of Richland Tp. (Hanes 1939).

Hanes #1067, collected in section 19 of Richland Tp. (possibly at Spring Brook) on 5 August 1937, may also be this species.

Panicum capillare L.
Witch Grass
Current status uncertain. Fields, lawns, and roadsides.

Panicum clandestinum L.
Current status uncertain. Moist to wet depressions in OAK-HARDWOOD-FOREST, and openings in HARDWOOD-SWAMP and RED-MAPLE-SWAMP.

Panicum columbianum Scribner
Rare. OAK-HARDWOOD-FOREST, sandy old fields, and open dry situations upslope from COASTAL-PLAIN-MARSH. Included in the Haneses' (1947) *P. tsugetorum* and *P. villosissimum*.

Panicum commutatum Schultes **Hanes:** *P. ashei*
Current status unknown. Collected by the Haneses from dry sandy soil near Goose and Sugarloaf Lakes.

Panicum depauperatum Muhl.
Starved Panic Grass
Occasional. Disturbed BLACK-OAK-BARREN and other dry sandy situations in the western half of the county.

Panicum dichotomiflorum Michaux
Fall Panicum
Occasional. Lawns, fields, and roadsides. Weedy.

Panicum dichotomum L.
Forked Panic Grass
Occasional. OAK-HARDWOOD-FOREST.

Panicum flexile (Gatt.) Scribner
Wiry Panic Grass
Occasional. Marly lakeside FEN, especially near spring discharge areas.

Panicum implicatum Britton
Occasional. Lakeshores and a diversity of other open situations.

Panicum latifolium L.
Current status unknown. OAK-HARDWOOD-FOREST.

Panicum leibergii (Vasey) Scribner
Very rare. Collected by L. A. Kenoyer in June 1926 from WET-PRAIRIE along the Michigan Central RR right-of-way near the WMU campus. Observed in 1980 growing at the top of a hill on the S side of Stadium Dr., a quarter of a mile W of Howard St. in dry-mesic soil near the Kenoyer collection site and along the former right-of-way of the same RR. Richard Brewer (1965) reports that this species was a common component of a former old growth WET-PRAIRIE in the aforementioned right-of-way that was mostly covered by fill in 1963–1964 during the "improvement" of Stadium Drive (see Brewer 1965). Also reported by Brewer (1984) from somewhat further W along the same former RR right-of-way, more or less across the street from the present intersection of Drake Rd. and Stadium Drive. These sites are/were remnants of a once extensive prairie, oak savanna, and wetland mosaic along the right-of-way of the former MI Central RR more or less along Stadium Dr. through the WMU campus and continuing to the west. I located a few plants in 1996 growing in wet-mesic TERRESTRIAL-PRAIRIE/BUR-OAK-SAVANNA E of the intersection of Stadium Dr. and Winchell Rd., on the N side of Stadium Dr. near where several large billboards stand (pers. obs. 2000). Not known elsewhere in the county.

Panicum lindheimeri Nash
Current status unknown. Collected by the Haneses from sandy soil in "woods" and "open ground," mostly in the vicinity of the Sugarloaf Lakes.

Panicum linearifolium Britton
Slender-leaved Panic Grass
Current status unknown. Once "infrequent" in "sandy fields" NE of Goose Lake and in BLACK-OAK-BARREN (Hanes & Hanes 1947). Voss (1972) refers the Haneses' *P. bicknellii* to this species (Hanes 1943).

Panicum meridionale Ashe
Matted Panic Grass
Current status uncertain. Wet sandy situations in the western half of the county. Includes the Haneses' (1947) *P. albemarlense*.

Panicum miliaceum L.
Proso; Broomcorn Millet
Current status unknown. Known only from collections made by the Haneses near the Schoolcraft dump in "waste places." First collected in 1937. Not native.

Panicum oligosanthes Schultes
Current status uncertain. Dry sandy soil of former BLACK-OAK-BARREN and WHITE-OAK-SAVANNA, OAK-HARDWOOD-FOREST, and old fields.

Panicum perlongum Nash
Current status unknown. Reported by the Haneses from RR right-of-ways, and collected by L. H. Harvey 15 June 1940 1 mi. W of Kalamazoo in "sandy outwash" (MICH). Last collected by the Haneses 26 June 1945 along a RR right-of-way through section 39 of Portage Tp. Probably not native.

Panicum philadelphicum Trin.
Current status uncertain, very rare if still extant. Known from the E side of Austin Lake near the former Austin Shores Golf Course in an area then dominated by COASTAL-PLAIN-MARSH, open OAK-HARDWOOD-FOREST, sandy WET-PRAIRIE, and oak savanna. The habitat in which the collection was made is unclear. Also collected from the border of Patton's Marsh 1.5 mi. NW of Schoolcraft (on Prairie Ronde), the border of the "Island" Marsh W of Schoolcraft (on Prairie Ronde), and from near Sugarloaf Lake. Last collected by the Haneses 22 September 1953 on the border of Patton's Marsh. All of these sites are on or very near Prairie Ronde and Gourdneck Prairie. Probably once a component of TERRESTRIAL-PRAIRIE and associated oak savanna.

Panicum praecocius Hitchc. & Chase
Current status unknown. Collected by the Haneses from section 18 of Richland Tp. and from near Mud Lake in Pavilion Tp.

Panicum rigidulum Nees
Current status unknown. Collected by F. W. Rapp from along a RR right-of-way 1 mi. E of Vicksburg on 11 September 1945. Not in Hanes & Hanes (1947).

Panicum sphaerocarpon Ell.
Current status unknown. Open, dry, sandy situations.

Panicum virgatum L.
Switch Grass
Occasional. RR rights-of-way, roadsides, FEN, WET-MEADOW, WET-PRAIRIE, TERRESTRIAL-PRAIRIE, and elsewhere, generally near open lakeshores.

Paspalum ciliatifolium Michaux **Hanes:** *P. pubescens*
Pubescent Paspalum
Current status uncertain. Dry, sandy, open situations, and BLACK-OAK-BARREN.

Phalaris arundinacea L.
Reed Canary Grass
Common. Wet old fields, disturbed WET-PRAIRIE, WET-MEADOW, FEN, HARDWOOD-SWAMP, and SHRUB-SWAMP. Usually a good indicator of disturbance such as grazing. Native and introduced plants occur here.

Phleum pratense L.
Timothy
Common. Roadsides, old fields, and other disturbed situations. Widely established.

Phragmites australis (Cav.) Steudel **Hanes:** *P. communis*
Reed
Common. Roadside ditches and lakeshores. Readily invades disturbed WET-MEADOW, FEN, BOG, EM-MARSH, SHRUB-CARR, and WET-PRAIRIE. Native and introduced plants occur here.

Poa alsodes Gray
Grove Meadow Grass
Current status unknown. Collected by the Haneses from a "swamp border" 1 mi. N of Goose Lake, and from two "wooded swamps" in Alamo Tp.

Poa annua L.
Annual Bluegrass
Common. Lawns and roadsides.

Poa bulbosa L.
Rare. Lawns in the Knollwood area of Kalamazoo City, just W of the WMU campus. First observed by the author in the lawn of Oak Forest Apartments in 1996. Not native. Not in Hanes & Hanes (1947).

Poa compressa L.
Canada Bluegrass
Common. Dry lawns and old fields. Widely established.

Poa languida Hitchc.
Weak Grass
Current status uncertain. SUGAR-MAPLE-FOREST and OAK-HARDWOOD-FOREST.

Poa nemoralis L.
Wood Bluegrass
Current status unknown. Collected by the Haneses from a lawn in the village of Schoolcraft. Not native.

Poa paludigena Fern. & Wieg.
Swamp Poa
Rare. Usually on small hummocks of moss in open RED-MAPLE-SWAMP, and in rich HARDWOOD-SWAMP near FEN and BOG (Hanes 1938). Easily overlooked.

Poa palustris L.
Fowl Meadow Grass
Occasional. WET-MEADOW and FEN.

Poa pratensis L.
Kentucky Bluegrass
Common. Lawns and other open situations. Not native.

Poa sylvestris Gray
Woodgrass
Current status uncertain. SUGAR-MAPLE-FOREST.

Poa trivialis L.
Current status unknown. Collected by the Haneses from the E shore of Long Lake, Pavilion Tp. Not native.

Puccinellia pallida (Torrey) Clausen **Hanes:** *Glyceria pallida*
Pale Manna Grass
Occasional. RED-MAPLE-SWAMP, EM-MARSH, and FEN.

Schizachne purpurascens (Torrey) Swallen
False Melic
Current status unknown. Collected by the Haneses from swampy depressions in forest throughout.

Sclerochloa dura (L.) P. Beauv.
Common Hardgrass
Locally established. Known only from a collection made by Richard K. Rabeler in 1999 at the Kalamazoo County Fairgrounds (MICH). Not in Hanes & Hanes (1947).

Secale cereale L.
Rye
Rare. Roadsides and RR rights-of-way. Not native.

Setaria glauca (L.) Beauv.
Yellow Foxtail
Occasional. Fields, roadsides, and RR rights-of-way. Included in the Haneses' (1947) *S. lutescens.* Not native.

Setaria italica (L.) Beauv.
Foxtail or Hungarian Millet
Occasional. Not in Hanes & Hanes (1947), but this taxon may have been included in their concept of *S. lutescens*. Not native.

Setaria verticillata (L.) Beauv.
Bristly Foxtail
Occasional. RR rights-of-way and other disturbed open situations. Not native.

Setaria viridis (L.) Beauv.
Green Foxtail
Occasional. Fields, gardens, and other disturbed situations. Not native.

Sorghastrum nutans (L.) Nash
Indian Grass
Occasional. TERRESTRIAL-PRAIRIE, WHITE-OAK-OPENING, and BLACK-OAK-BARREN. Rare in FEN meadow and other relatively wet situations. Essentially a dry-mesic to dry TERRESTRIAL-PRAIRIE and oak savanna generalist.

Sorghum halepense (L.) Pers.
Johnson Grass
Rare. Roadsides, RR rights-of-way, and old fields. A perennial, otherwise difficult to discern from *S. sudanense* which is an annual. Rarely escaped.

Sorghum sudanense (Piper) Stapf
Rarely escaped. Disturbed situations (see *S. halepense*). Not in Hanes & Hanes (1947).

Spartina pectinata Link
Cordgrass
Occasional to common. FEN, WET-MEADOW, and WET-PRAIRIE. Declining due to degradation and loss of wetland habitat.

Sphenopholis intermedia (Rydb.) Rydb.
Slender Wedge Grass
Occasional. Moist to wet depressions in HARDWOOD-SWAMP and RED-MAPLE-SWAMP.

Sphenopholis nitida (Biehler) Scribner
Current status unknown. OAK-HARDWOOD-FOREST.

Sphenopholis obtusata (Michaux) Scribner
Early Bunch Grass
Current status uncertain. Moist sandy situations in the western half of the county.

Sporobolus asper (Michaux) Kunth
Long-leaved Rush Grass
Rare. RR rights-of-way in the south half of the county (Hermann 1936). Easily overlooked due to its late-season development. Probably adventive.

Sporobolus cryptandrus (Torrey) Gray
Sand Dropseed
Occasional. Dry sandy soil along roadsides and in old fields.

Sporobolus heterolepis (Gray) Gray
Prairie Dropseed
Very rare. Reported by the Haneses only from a collection made by L. A. Kenoyer from a "Bridle Path SW of Kalamazoo" (along the right-of-way of the former MI Central RR, est. in 1847). Collected in 1940 from a "bank" along Stadium Dr., probably near its current intersection with Howard St., and not far from the location of the L. A. Kenoyer collection. The Haneses were apparently not aware of the latter collection. At Whitman Lake in Fort Custer *Sporobolus heterolepis* is occasional in FEN. Probably occurs elsewhere in the county in FEN. Easily overlooked.

Sporobolus neglectus Nash
Current status unknown. Collected by the Haneses from dry old fields in the NE ¼ of the county.

Sporobolus vaginiflorus (Torrey) Wood
Occasional. Dry old fields and roadsides.

Stipa avenacea L.
Black Oat Grass
Current status uncertain. BLACK-OAK-BARREN, OAK-HARDWOOD-FOREST, and dry old fields.

Stipa comata Trin. & Rupr.
Extinct. First collected by the Haneses 26 September 1936 from dry soil along a RR right-of-way W of Indian Lake (Hanes 1938). Again collected here on 27 July 1947 by W. B. Drew (MSC). Not since collected. Probably adventive.

Stipa spartea Trin.
Porcupine Grass
Current status uncertain, very rare if still extant. Collected by the Haneses from the western half of the county along former dry-mesic prairie roadsides and RR rights-of-way, in remnant TERRESTRIAL-PRAIRIE and adjacent oak savanna. No longer known from any former sites, but there is a small chance that a few plants may persist in unsearched areas in the western half of the county. This

grass was once relatively common, and was at least locally an important component of TERRESTRIAL-PRAIRIE and oak savanna.

Tridens flavus (L.) Hitchc. **Hanes:** *Triodia flava*
Purpletop
Occasional. Dry to moist open roadsides. Locally established.

Triticum aestivum L.
Wheat
Common. Roadsides and RR rights-of-way. Not native.

Zizania aquatica L.
Wild-rice
Rare. EM-MARSH. There are two varieties in Kalamazoo County. The var. *aquatica* is taller and more widely distributed than var. *angustifolia* which is rather local and nearly restricted to the lakeside/streamside margins of FEN. The var. *angustifolia* is especially frequent in the Gourdneck State Game Area.

CYPERACEAE **Sedge Family**

This is a large and diverse family in Kalamazoo County. Several species otherwise unfamiliar to me are reported here based only upon annotations made to herbarium specimens by A. A. Reznicek and E. G. Voss (Voss 1996, 1985, 1972). The Haneses were diligent students of the genus *Carex*. They collected most of the species listed below. Their work with the genus benefited much from the tutelage of Frederick J. Hermann (Voss & Reznicek 1981). Most of the native *Carex* spp. are represented by relatively few herbarium specimens. I have found that many of these little-collected species are actually relatively common in the field. Clearly, many are overlooked or ignored by plant collectors.

Bulbostylis capillaris (L.) C. B. Clarke
Hair Sedge
Occasional. Dry sandy old fields and BLACK-OAK-BARREN, primarily in the western half of the county (Hanes 1945b).

Carex aggregata Mack.
Current status unknown. Collected by the Haneses from lawns in the village of Schoolcraft (Hanes 1938). Possibly adventive.

Carex alata Torrey
Occasional. WET-MEADOW, FEN, and openings in wet TAMARACK-SWAMP, mostly in the south half of the county.

Carex albolutescens Schw.
Very rare. RED-MAPLE-SWAMP in the south half of the county. Only one extant occurrence is known, but several sites reported by the Haneses remain intact and unsearched. Not known to be extant elsewhere in Michigan (Hanes 1938).

Carex albursina Sheldon
Current status unknown. SUGAR-MAPLE-FOREST and OAK-HARDWOOD-FOREST.

Carex alopecoidea Tuckerman
Current status uncertain. Collected by the Haneses from “marshy meadows E of Augusta near the Kalamazoo River” and “the steep bank of a drain” in Wakeshma Tp. Recently reported only from FLOODPLAIN-FOREST along the Kalamazoo River at the Augusta Floodplain Forest Preserve where it was “infrequent” (Meagher & Tonsor 1992).

Carex amphibola Steudel
Current status unknown. Near the Kalamazoo River in FLOODPLAIN-FOREST, and SUGAR-

MAPLE-FOREST on nearby levees (Meagher & Tonsor 1992). Also reported from OAK-HARDWOOD-FOREST.

Carex annectens (Bickn.) Bickn.
Current status uncertain. Known from a collection made by the Haneses (accompanied by F. J. Hermann) from a "swamp border," N of Vicksburg. Recently (1994) collected by P. J. Higman (MNFI) from an "open dry field" at Fort Custer. Probably overlooked.

Carex aquatilis Wahl. **Hanes:** *C. substricta, & C. haydenii*
Occasional. WET-MEADOW and FEN. The Haneses' *C. haydenii* has been placed here by F. J. Hermann.

Carex arctata Boott
Occasional. SUGAR-MAPLE-FOREST, HARDWOOD-SWAMP, and RED-MAPLE-SWAMP.

Carex argyrantha Tuckerman
Current status uncertain. Collected in 1947 by F. W. Rapp on a sandy wooded hill near a marsh in the SE ¼ , SE ¼ , section 34, Schoolcraft Tp. This species usually has a more N range (Hanes 1950). Not in Hanes & Hanes (1947).

Carex artitecta Mack.
Current status unknown. Collected by the Haneses from terrestrial forests bordering wetlands in the southwest quarter of the county.

Carex atherodes Sprengel
Current status uncertain. WET-MEADOW and EM-MARSH.

Carex atlantica Bailey **Hanes:** *C. incomperta*
Current status uncertain. Shrubby lakeside BOG in the SW¼ of the county.

Carex aurea Nutt.
Current status uncertain. Collected by the Haneses from a "meadow" 1 mi. SW of Scotts.

Carex bebbii (Bailey) Fern.
Occasional. WET-MEADOW, FEN, and WET-PRAIRIE.

Carex bicknellii Britton
Rare. Collected by the Haneses from along RR rights-of-way through former TERRESTRIAL-PRAIRIE, and in oak savanna. Now rare in some of the same places. The only sizeable populations that persist are at Harris Prairie (section 2 of Oshtemo Tp.), and near the former right-of-way of the MI Central RR at the NW corner of the intersection of Drake Rd. and Stadium Dr. (a droughty dry-mesic former WHITE-OAK-SAVANNA on the former edge of Genessee Prairie). Probably once a common component of TERRESTRIAL-PRAIRIE and oak savanna.

Carex blanda Dewey
Current status unknown. HARDWOOD-SWAMP, RED-MAPLE-SWAMP, and low moist areas in SUGAR-MAPLE-FOREST.

Carex brevior (Dewey) Mack.
Current status unknown. Collected by the Haneses from OAK-HARDWOOD-FOREST and SUGAR-MAPLE-FOREST in the south half of the county.

Carex bromoides Willd.
Occasional. Swamp forests, usually in mucky wet depressions.

Carex brunnescens (Pers.) Poiret
Occasional. BOG.

Carex buxbaumii Wahl.
Occasional. FEN. Once also a component of WET-PRAIRIE, but no longer known from this habitat.

Carex canescens L.
Occasional. Open HARDWOOD-SWAMP, RED-MAPLE-SWAMP, WET-MEADOW, and BOG.

Carex careyana Dewey
Current status unknown. HARDWOOD-SWAMP, RED-MAPLE-SWAMP, and SUGAR-MAPLE-FOREST.

Carex cephalantha (Bailey) Bickn. **Hanes:** *C. laricina*
Current status unknown. Collected by the Haneses from BOG and FEN in the south half of the county.

Carex cephaloidea (Dewey) Dewey
Thin-leaved Sedge
Occasional. SUGAR-MAPLE-FOREST.

Carex cephalophora Willd.
Oval-headed Sedge
Occasional. SUGAR-MAPLE-FOREST and swamp forests.

Carex communis Bailey
Current status unknown. Collected by the Haneses from SUGAR-MAPLE-FOREST.

Carex comosa Boott
Bristly Sedge
Occasional. Borders of lakes and streams, and TAMARACK-SWAMP.

Carex conoidea Willd.
Current status uncertain. Collected by the Haneses from "a moist grassy meadow on the border of a tamarack wood, one mi. SW of Scotts," and from along a RR right-of-way in section 17 of Pavilion Tp. Perhaps once an oak savanna/prairie species.

Carex convoluta Mack.
Occasional. SUGAR-MAPLE-FOREST and OAK-HARDWOOD-FOREST.

Carex crinita Lam.
Occasional. Mucky depressions in HARDWOOD-SWAMP, RED-MAPLE-SWAMP, FLOOD-PLAIN-FOREST, and TAMARACK-SWAMP.

Carex cristatella Britton
Occasional. SUGAR-MAPLE-FOREST, HARDWOOD-SWAMP, RED-MAPLE-SWAMP, FLOODPLAIN-FOREST, and in a diversity of other relatively shaded and moist situations.

Carex cryptolepis Mack.
Rare. On the borders of sandy lakes and ponds, often in COASTAL-PLAINS-MARSH. Declining, apparently due to development along sandy lakeshores and manipulation of water levels.

Carex debilis Michaux
Current status unknown. Collected by the Haneses from SUGAR-MAPLE-FOREST and OAK-HARDWOOD-FOREST, usually near wetlands.

Carex deweyana Schw.
Current status uncertain. Collected by the Haneses "from the N side of Parker's woods . . . NW of Kalamazoo."

Carex diandra Schrank
Current status unknown. Collected by the Haneses from along "boggy shores" of lakes and creeks.

Carex digitalis Willd.
Current status unknown. Collected by the Haneses from "moist woods."

Carex disperma Dewey
Rare. Wet depressions in HARDWOOD-SWAMP and RED-MAPLE-SWAMP.

Carex emmonsii Dewey
Current status uncertain. Perhaps a former oak savanna species. Herbarium specimens are mostly from relatively open and sandy, wet substrates.

Carex emoryi Dewey
Current status uncertain. Collected by the Haneses from several widely separated sites where it was "rare in marshy meadows" (Hermann 1941).

Carex festucacea Willd.
Current status uncertain; very rare if still extant. Collected by Father P. E. Herbert (Notre Dame) 21 June 1952 from a "marsh" " ¼ mile E of the Vicksburg Depot." Not in Hanes & Hanes (1947).

Carex flava L.
Current status uncertain. Collected by the Haneses from "a grassy meadow bordering a swampy wood E of Mud (Veley) Lake, Alamo Tp." (probably a FEN).

Carex foenea Willd. **Hanes:** *C. siccata*
Current status uncertain. Collected by the Haneses only from "grassy banks along the roadside near the Neasmith RR crossing 4 mi. E of Schoolcraft." This is an area of dry-mesic to mesic oak savanna bordering former TERRESTRIAL-PRAIRIE. A few prairie and savanna plants persist at the site in fencerows and along the RR right-of-way (pers. obs. 1996).

Carex frankii Kunth
Very rare. Rich HARDWOOD-SWAMP in the SE ¼ of the county, usually near streams (Hanes 1941).

Carex gracilescens Steudel
Current status unknown. Collected by the Haneses from rich SUGAR-MAPLE-FOREST in Prairie Ronde Tp.

Carex gracillima Schw.
Occasional. HARDWOOD-SWAMP, RED-MAPLE-SWAMP, SUGAR-MAPLE-FOREST, and FLOODPLAIN-FOREST.

Carex granularis Willd.
Current status unknown. RED-MAPLE-SWAMP and WET-MEADOW. Includes the Haneses' (1947) *C. haleana*.

Carex grayi Carey
Occasional. HARDWOOD-SWAMP and RED-MAPLE-SWAMP.

Carex hirsutella Mack.
Current status uncertain. Collected by the Haneses from the "border of a swamp NE of Goose Lake."

Carex hirtifolia Mack.
Current status unknown. Rich HARDWOOD-SWAMP, RED-MAPLE-SWAMP, and SUGAR-MAPLE-FOREST.

Carex hitchcockiana Dewey
Current status unknown. SUGAR-MAPLE-FOREST.

Carex howei Mack.
Current status uncertain. Collected by the Haneses from "low woods" on the SE side of Goose Lake, and ¾ mi. NE of Goose Lake "often in water." Also known from near the portion of Goose Lake in Berrein Co. One site the Haneses called "Ernest Newman's low woods" is near Goose Lake in section 32 of Prairie Ronde Tp. Last collected in 1938 at this station. The Kalamazoo County and Berrien County collections are the only ones known from Michigan. The Kalamazoo County specimens are not wholly typical of this species (see Voss 1972).

Carex hystericina Willd. **Hanes:** *C. hystricina*
Porcupine Sedge
Occasional. HARDWOOD-SWAMP, RED-MAPLE-SWAMP, WET-MEADOW, and SUGAR-MAPLE-FOREST.

Carex interior Bailey
Current status uncertain. EM-MARSH, COASTAL-PLAIN-MARSH, and other wet, sandy situations.

Carex intumescens Rudge
Occasional. HARDWOOD-SWAMP, RED-MAPLE-SWAMP, and in depressions in other kinds of forest.

Carex jamesii Schw.
Very rare. Rich, (usually) old-growth SUGAR-MAPLE-FOREST. Typically in areas where there has been little recent canopy disturbance such as beneath large old *Quercus rubra*.

Carex lacustris Willd.
Occasional. WET-MEADOW. Also found in ditches, alongside BOG moats in SHRUB-SWAMP, and bordering rivers and streams. This is reportedly the dominant *Carex* in WET-MEADOW and EM-MARSH along the Kalamazoo River (Meagher & Tonsor 1992).

Carex laevivaginata (Kuek.) Mack.
Occasional. Forming caespitose clumps in EM-MARSH, open swamp forests, and FEN. Especially frequent near streams.

Carex lanuginosa Michaux
Current status unknown. EM-MARSH and lakeshores.

Carex lasiocarpa Ehrh.
Occasional. FEN, BOG, and WET-MEADOW.

Carex laxiculmis Schw.
Occasional. Collected by the Haneses from "woods."

Carex laxiflora Lam.
Current status uncertain. Collected by the Haneses from low SUGAR-MAPLE-FOREST. Reportedly "infrequent" in "marsh" near the Kalamazoo River at the Augusta Floodplain Preserve (Meagher & Tonsor 1992).

Carex leavenworthii Dewey
Current status unknown. Collected by the Haneses from lawns and "gravely sandy soil" in Schoolcraft and Kalamazoo Tps. (Hanes 1939).

Carex leptalea Wahl.
Current status unknown. FEN.

Carex leptonervia Fern.
Current status unknown. Collected by the Haneses from SUGAR-MAPLE-FOREST in the E ½ of the county. Last collected in 1941.

Carex limosa L.
Occasional. BOG in the S ½ of the county.

Carex longii Mack.
Rare. Shrubby seepage BOG (large areas are dominated by SHRUB-CARR) surrounding Mud Lake (Portage Tp.), and in similar acidic habitats including RED-MAPLE-SWAMP elsewhere in the S ½ of the county (Hanes 1939).

Carex lupuliformis Dewey
Current status uncertain, very rare if still extant. Known with certainty only from collections made on 26, 29, and 31 of August 1950 from the SE ¼ of the SE ¼ of section 13 of Brady Tp. on the S and E sides of the F. W. Rapp woods. No plants were found here in the several visits I made to this site between 1996–1999. This forest has been partly destroyed by horse pasture and other development (pers. obs.). Reported by Meagher & Tonsor (1992) from wet muck in FLOODPLAIN-FOREST near the Kalamazoo River, but this purported specimen is not at WMU, KBSMS, MICH, or MSC, and may have been re-identified (A. Reznicek pers. comm.). Not in Hanes & Hanes (1947).

Carex lupulina Willd.
Occasional. Swamp forests and WET-MEADOW.

Carex lurida Wahl.
Current status unknown. Once "infrequent" in "marshes" and "tamarack swamps" (Hanes & Hanes 1947).

Carex mesochorea Mack.
Current status unknown. Known from a single Hanes collection made from along a Kalamazoo street on 19 May 1949 (MICH). Not native. Not in Hanes & Hanes (1947).

Carex molesta Mack.
Current status uncertain. Collected by the Haneses from near the Kalamazoo River in "moist soil near the Allied Paper Mills," from a "marshy meadow E of Augusta," and from "somewhat high ground . . . W of Galesburg."

Carex muhlenbergii Willd.
Occasional. BLACK-OAK-BARREN, and quite generally in open, dry, sandy ecotone.

Carex muskingumensis Schw.
Current status uncertain. Known from a single specimen collected by L. A. Kenoyer 21 June 1932 "on the border of a ditch in the NW ¼ of section 8 of Pavilion Tp."

Carex normalis Mack.
Current status unknown. Collected by the Haneses from "dry or semi-moist woodlands," mostly in the N half of the county.

Carex oligocarpa Willd.
Current status uncertain, very rare if still extant. Collected by the Haneses from the "Sugarlot" (a poorly drained SUGAR-MAPLE-FOREST) immediately W of Schoolcraft in Prairie Ronde Tp. Also collected from E of Kalamazoo by an unknown collector, and by O. A. Farwell in 1920 from section 18 of Charleston Tp. (5558 ½ BLH).

Carex oligosperma Michaux
Occasional. BOG, usually in *Spaghnum* moss.

Carex pedunculata Willd.
Current status unknown. Collected by the Haneses from rich SUGAR-MAPLE-FOREST.

Carex pensylvanica Lam.
Common. Most lightly shaded and sandy terrestrial plant communities. Probably once modal in dry to mesic oak savanna and OAK-HARDWOOD-FOREST (in light shade). Voss (1972) notes that the only Michigan collection seen of var. *digyna* was made by F. W. Rapp (6957 WMU) on 26 May 1941 from the E bank of Sunset Lake.

Carex plantaginea Lam.
Occasional. SUGAR-MAPLE-FOREST and HARDWOOD-SWAMP.

Carex prairea Dewey
Occasional. FEN sedge meadow and WET-MEADOW. Perhaps once a component of WET-PRAIRIE.

Carex prasina Wahl.
Current status unknown. Collected by the Haneses from SUGAR-MAPLE-FOREST in section 10 of Brady Tp. Last collected in 1942.

Carex projecta Mack.
Current status unknown. Collected by the Haneses from the SE ¼ of the county in HARDWOOD-SWAMP, RED-MAPLE-SWAMP, and low SUGAR-MAPLE-FOREST.

Carex pseudo-cyperus L.
Current status unknown. Collected by the Haneses from wet, boggy HARDWOOD-SWAMP, and RED-MAPLE-SWAMP.

Carex retroflexa Willd.
Current status unknown. Collected by the Haneses from the lawn of the M. P. Thomas farm in Schoolcraft on 4 July 1943 (Hanes 1945b). Probably not native.

Carex retrorsa Schw.
Occasional. Swamp forests.

Carex rosea Willd.
Occasional. SUGAR-MAPLE-FOREST and OAK-HARDWOOD-FOREST.

Carex rostrata Stokes
Current status unknown. WET-MEADOW and EM-MARSH.

Carex rugosperma Mack.
Current status unknown. Sandy ecotone near wetlands, mostly in the W half of the county. Includes the Haneses' (1947) *C. tonsa.*

Carex sartwellii Dewey
Rare. Collected by the Haneses from open swampy habitats (mostly FEN) primarily in the SW ¼ of the county. Frequently associated with ponds on Prairie Ronde.

Carex scabrata Schw.
Current status uncertain. WET-MEADOW and spring discharge areas in FEN.

Carex scoparia Willd.
Current status uncertain. Mesic depressions in BLACK-OAK-BARREN, COASTAL-PLAIN-MARSH, and near sandy lakeshores, mostly in the SW ¼ of the county.

A hybrid, *C. suberecta* × *C. scoparia* was found on 23 June 1992 by A. A. Reznicek on the S side of VW Ave. at the center of section 14 of Schoolcraft Tp.

Carex seorsa Howe
Current status uncertain. Collected by the Haneses from a wetland border near Vicksburg. Last reported here by Kim Chapman in 1980 (K. Chapman, MNFI Site Survey Report 1980). Some associates in 1980 included *Acer rubrum, Ilex verticillata, Maianthemum canadense, Prunus serotina, Quercus rubra,* and *Vaccinnium macrocarpon*.

Carex sparganioides Willd.
Current status unknown. Rich, relatively wet SUGAR-MAPLE-FOREST.

Carex sterilis Willd.
Occasional. FEN, WET-MEADOW, and WET-PRAIRIE.

Carex stipata Willd.
Awl-fruited Sedge
Current status unknown. Reported by the Haneses to be "frequent" in the SW ¼ of the county in "moist ground."

Carex straminea Willd. **Hanes:** *C. richii*
Very rare. Collected by A. A. Reznick at the edge of a *Quercus palustris*, *Acer rubrum* woods bordering a highbush blueberry thicket SE of the junction of 23rd St. and U Ave. 1.5 mi. N of Vicksburg at the center of the N edge of section 12 of Schoolcraft Tp. on 23 June 1992, and from a wet open maple woods at the edge of a shrubby BOG. Apparently limited to the immediate vicinity of Schoolcraft Tp. This species is at the northernmost edge of its range in Michigan.

Carex stricta Lam.
Tussock Sedge
Common. FEN, WET-MEADOW, SHRUB-CARR, and similar wet, often somewhat disturbed situations (probably once including WET-PRAIRIE). Both the var. *strictior* and the much rarer var. *stricta* are known from Kalamazoo County. The status of var. *stricta* is unknown. A known host plant for larvae of the federally endangered Mitchell's Satyr Butterfly *(Neonympha mitchellii mitchellii)* which is known from several Kalamazoo County fens.

Carex suberecta (Olney) Britton
Current status unknown. Collected by F. W. Rapp from an EM-MARSH one mi. W of Vicksburg. Known to hybridize with *C. scoparia* (see *C. scoparia*).

Carex swanii (Fern.) Mack.
Occasional. OAK-HARDWOOD-FOREST and shady situations in BLACK-OAK-BARREN.

Carex tenera Dewey
Current status unknown. Collected by the Haneses from moist open ground including roadsides, old fields, and forest openings. Perhaps once a savanna/prairie species.

Carex tetanica Schk.
Current status unknown. Collected by the Haneses from dry to moist situations including RR rights-of-way, WET-MEADOW, and FEN. Perhaps once a savanna/prairie species. Includes the Haneses' (1947) *C. meadii.*

Carex tribuloides Wahl.
Current status uncertain. HARDWOOD-SWAMP and wet open ground along lakeshores and creeks.

Carex trisperma Dewey
Occasional. BOG, FEN, and RED-MAPLE-SWAMP.

Carex tuckermanii Dewey
Current status unknown. Collected by the Haneses from WET-MEADOW and the edge of small ponds in the S half of the county.

Carex umbellata Willd.
Current status uncertain, very rare if still extant. Collected by the Haneses from 3 mi. E of Schoolcraft near a RR right-of-way (Hanes 1940).

Carex vesicaria L.
Current status unknown. Collected by the Haneses from a few widely scattered locations in the S ½ of the county (but mostly without habitat data). One collection was from the site of an ephemeral pond.

Carex virescens Willd.
Current status uncertain, very rare if still extant. Collected by the Haneses from a "low meadow . . . in section 31 of Wakeshma Tp." Last collected in 1939.

Carex viridula Michaux
Occasional. COASTAL-PLAIN-MARSH and sandy lakeshores in the W ½ of the county. Declining due to lakeshore development.

Carex vulpinoidea Michaux
Common. Wet roadsides, wet old fields, HARDWOOD-SWAMP, WET-MEADOW, and SHRUB-SWAMP.

Carex woodii Dewey
Current status uncertain. Wet SUGAR-MAPLE-FOREST, HARDWOOD-SWAMP, and RED-MAPLE-SWAMP.

Cladium marsicoides (Muhl.) Torrey
Twig-rush
Occasional. BOG, FEN, and EM-MARSH, mostly in the SW ¼ of the county.

Cyperus diandrus Torrey
Rare. FEN, usually near water.

Cyperus engelmannii Steudel
Current status unknown. Reported by the Haneses from ponds and lakeshores, mostly in the W half of the county.

Cyperus erythrorhizos Muhl.
Current status unknown. Collected by the Haneses from WET-MEADOW near water.

Cyperus esculentus L.
Chufa
Common. Open, wet, disturbed ground.

Cyperus filiculmis Vahl.
Occasional. Dry, sandy old fields, and disturbed BLACK-OAK-BARREN. Several specimens collected by the author in section 24 of Alamo Tp. appear intermediate between this species and *C. schweinitzii* Torrey, supporting the suggestion by Voss (1972) that a hybrid complex including these two species may exist in Michigan.

Cyperus flavescens L.
Current status uncertain, very rare if still extant. Collected by the Haneses from WET-MEADOW near Flowerfield Creek in section 36 of Prairie Ronde Tp.

Cyperus odoratus L.
Occasional. Sandy lakeshores, often in COASTAL-PLAIN-MARSH.

Cyperus rivularis Kunth
Shining Cyperus
Occasional. Usually in sandy substrates near disturbed lakeshores, and in COASTAL-PLAIN-MARSH.

Cyperus schweinitzii Torrey
Occasional. Disturbed BLACK-OAK-BARREN, primarily in the NW ¼ of the county. Always in sand. Apparent hybrids with *C. filiculmis* have been found in section 24 of Alamo Tp. (see *C. filiculmis*).

Cyperus strigosus L.
Occasional. Moist to wet open disturbed situations, usually near water.

Dulichium arundinaceum (L.) Britton
Three-way sedge
Occasional. EM-MARSH, WET-MEADOW, BOG, and FEN.

Eleocharis acicularis (L.) R. & S.
Current status unknown. EM-MARSH.

Eleocharis elliptica Kunth
Current status uncertain. EM-MARSH and FEN. Includes the Haneses' (1947) *E. compressa.*

Eleocharis engelmanii Steudel
Current status uncertain, very rare if still extant. Once "rare" in EM-MARSH of small ponds in the S half of the county (Hanes & Hanes 1947). Most former sites were associated with marshes on Prairie Ronde. Decline is due to draining and past or present cultivation of most small wet depressions on Prairie Ronde.

Eleocharis equisetoides (Ell.) Torrey
Knotted Spike Rush
Rare. EM-MARSH and open muddy lake borders.

Eleocharis erythropoda Steudel **Hanes:** *E. calva*
Current status uncertain. Mucky EM-MARSH alongside streams through FEN. Specimens from the Hampton Creek wetlands complex previously identified as *Eleocharis compressa* have been reidentified as this species.

Eleocharis intermedia Schultes
Current status uncertain. Lake or streamside WET-MEADOW, EM-MARSH, and FEN.

Eleocharis melanocarpa Torrey
Black-fruited Spike Rush
Rare. Sandy lakeshores and COASTAL-PLAIN-MARSH in the W ½ of the county. Declining due to habitat loss.

Eleocharis obtusa (Willd.) Schultes
Current status uncertain. BOG and sandy EM-MARSH.

Eleocharis olivacea Torrey
Occasional. EM-MARSH, SUB-MARSH, and open muddy environments bordering otherwise mostly sandy-bottomed lakes.

Eleocharis pauciflora (Lightf.) Link
Few-flowered Spike Rush
Current status unknown. Collected by the Haneses from along marly lakeshores in FEN, and from EM-MARSH and WET-MEADOW in the W ½ of the county.

Eleocharis quadrangulata (Michaux) R. & S.
Angled Spike Rush
Very rare. Collected by the Haneses from water 0–1 ft. deep (variable from year to year) in sandy, muddy EM-MARSH at Pickerel Lake. Still persisting in 1996. Only population ever known in Kalamazoo County.

Eleocharis robbinsii Oakes
Robbin's Spike Rush
Occasional. EM-MARSH. The "small floating islands . . . carpeted with this species" reported by the Haneses (1947) in Crooked Lake have not been observed by the author in the four years that the lake has been visited. Boat traffic has damaged the shallow wetlands on the W end of this sandy former COASTAL-PLAIN-MARSH.

Eleocharis rostellata Torrey
Current status uncertain. EM-MARSH, FEN, and WET-MEADOW, mostly in the W ½ of the county.

Eleocharis smallii Britton
Current status unknown. Collected by the Haneses from EM-MARSH, mostly in the W ½ of the county.

Eriophorum angustifolium Honck.
Current status uncertain. Collected by the Haneses from the SE ½ of section 30 of Brady Tp. This site was originally located by F. W. Rapp.

Eriophorum gracile W. D. J. Koch
Current status uncertain. Lakeside BOG. May be limited to the S ½ of the county.

Eriophorum spissum Fern.
Occasional. BOG in the S ½ of the county.

Eriophorum tenellum Nutt.
Very rare. A single population has long been known at LeFevre BOG in section 8 of Climax Tp. (Hanes 1943).

Eriophorum virginicum L.
Tawny Cotton-grass
Occasional throughout in BOG.

Eriophorum viridi-carinatum (Engelm.) Fern.
Occasional. BOG.

Fimbristylis autumnalis (L.) R. & S.
Occasional. COASTAL-PLAIN-MARSH and EM-MARSH on sandy lakeshores in the SW ¼ of the county.

Fuirena squarrosa Michaux **Hanes:** *F. pumila*
Umbrella-grass
Occasional. COASTAL-PLAIN-MARSH, primarily in the SW ¼ of the county. Varies in abundance from year to year depending on water levels.

Hemicarpha micrantha (Vahl) Pax
Rare to common on sandy lakeshores in COASTAL-PLAIN-MARSH, mostly in the W ½ of the county. Varies considerably in abundance depending on water levels. In 1999, a year of exceedingly low water levels, *H. micrantha* was quite rare at Crooked, Pretty, and Eagle Lakes. The previous year when water levels were higher, plants were abundant.

Psilocarya scirpoides Torrey
Bald-rush
Current status uncertain, very rare if still extant. Collected by the Haneses from COASTAL-PLAIN-MARSH at Eagle Lake, Mud Lake, and Pine Island Lake (all in Texas Tp.), Stony Lake (Ross Tp.), and Bishop's Bog (Portage Tp., probably in the COASTAL-PLAIN-MARSH community that borders the bog), and near West Lake. At Bishop's bog, shrub growth now occupies large areas of the former COASTAL-PLAIN-MARSH. All of the other former sites have been altered since the plant was last collected. Some suitable habitat remains at most former sites, but I have not yet found even one plant. The Haneses noted that a smut fungus (*Cintractia psilocaryae*) infests the spikelets. This can be seen on most herbarium specimens.

Rhynchospora alba (L.) Vahl
White Beak Rush
Occasional. BOG and FEN, mostly in the S ½ of the county.

Rhynchospora capillacea Torrey
Hair Beak Rush
Occasional. FEN.

Rhynchospora capitellata (Michaux) Vahl
Clustered Beak Rush
Occasional. WET-MEADOW and COASTAL-PLAIN-MARSH.

Rhynchospora fusca (L.) Ait. f.
Brown Beak Rush
Very rare. Reported by the Haneses (1947) and still persisting in oxidizing peat in a BOG adjoining Bishop's BOG and West Lake BOG, SW of West Lake. This site is now part of the West Lake Nature Preserve. In years of low water levels, plants can be seen from a small floating observation area. The plants are not apparent in high water years (Hanes 1940).

Rhynchospora macrostachya Gray
Horned Beak Rush
Occasional. COASTAL-PLAIN-MARSH and wet depressions in BOG. Mostly in the W ½ of the county.

Scirpus acutus Bigelow
Hardstem Bulrush
Common. FEN and EM-MARSH.

Scirpus americanus Pers.
Threesquare
Occasional. EM-MARSH, WET-MEADOW, and FEN.

Scirpus atrovirens Willd.
Dark-green Bulrush
Common. EM-MARSH, SHRUB-SWAMP, WET-MEADOW, FEN, and WET-PRAIRIE.

Scirpus cyperinus (L.) Kunth
Wool-grass
Occasional. FEN, WET-MEADOW, and BOG. Includes the Haneses' (1947) *S. pedicellatus*.

Scirpus expansus Fern.
Current status unknown. Collected by the Haneses from EM-MARSH of "swamps" and streams (Hanes 1943).

Scirpus fluviatilis (Torrey) Gray
River Bulrush
Current status uncertain. EM-MARSH, mostly in the W ½ of the county.

Scirpus pendulus Muhl. **Hanes:** *S. lineatus*
Reddish Bulrush
Current status unknown. Collected by the Haneses from alkaline open and wooded wetlands in the E ½ of the county.

Scirpus smithii Gray
Current status uncertain. Sandy EM-MARSH of ponds, mostly in the W ½ of the county (Hermann 1936). Includes the Haneses' (1947) *S. purshianus.*

Scirpus subterminalis Torrey
Water Club Rush
Current status unknown. Collected by the Haneses from SUB-MARSH and EM-MARSH of sand or marl-bottomed lakes mostly in the W ½ of the county.

Scirpus validus Vahl
Softstem Bulrush
Occasional. Lake margins, usually in sandy EM-MARSH.

Scleria pauciflora Willd.
Very rare. First collected in Kalamazoo County by the author in 1997 from an open sandy depression at the edge of a small pond otherwise surrounded by disturbed remnant OB in Alamo Twsp. This site resembles COASTAL-PLAIN-MARSH and is affected by the fluctuating water level of the adjacent pond (pers. obs.). Associated with *Aletris farinosa, Lycopodiella inundata, Viola palmata, Viola lanceolata, Viola sagittata, Hypericum prolificum, Lobelia siphilitica*, *Rhynchospora capitellata, Bartonia virginica,* young *Quercus velutina,* and others. Not in Hanes & Hanes (1947).

Scleria triglomerata Michaux
Current status uncertain, very rare if still extant. Collected by the Haneses from sandy WET-PRAIRIE. Most Hanes collections are from the S ½ of the county. Collected at Grand Prairie by the first botanical survey. All known former sites have been destroyed by development, grazing, or are overgrown with shrubs and/or trees.

Scleria verticillata Willd.
Current status uncertain. Marly lakeside depressions in FEN and WET-MEADOW.

ARACEAE — Arum Family

Acorus calamus L.
Sweet-flag; Calamus
Current status uncertain. WET-MEADOW and EM-MARSH, almost exclusively near the Kalamazoo River.

Arisaema dracontium (L.) Schott
Green Dragon; Dragon-root
Rare. FLOODPLAIN-FOREST, HARDWOOD-SWAMP, and rich, relatively wet SUGAR-MAPLE-FOREST.

Arisaema triphyllum (L.) Schott **Hanes:** *A stewardsonii* & *A. atrorubens*
Jack-in-the-pulpit; Indian-turnip
Common. SUGAR-MAPLE-FOREST and other rich mesic to wet-mesic forests. More frequent at relatively wet sites such as on outwash than at well-drained sites. The var. *stewardsonii* (in which the tube of the spathe is fluted or corrugated) is less common than the typical variety, but often grows with it. There is much variation in the size and color of the spathe and the plants themselves at most sites. This morphological variation is well documented by the Haneses at the "Island" woods W of Schoolcraft where plants can be found growing in relatively close proximity to one another that exhibit characters (however not convincingly typical) of *A. atrorubens* and *A. triphyllum* var. *stewardsonii*.

Calla palustris L.
Wild Calla; Water-arum
Rare. SHRUB-SWAMP and wet, lightly shaded depressions in BOG. Usually grows in water beneath *Cephalanthus occidentalis* and other water-loving shrubs.

Peltandra virginica (L.) Schott & Endl.
Arrow-arum; Tuckahoe
Occasional. EM-MARSH, BOG, and other swampy situations.

Symplocarpus foetidus (L.) Nutt.
Skunk-cabbage
Common. RED-MAPLE-SWAMP, HARDWOOD-SWAMP, TAMARACK-SWAMP, FLOOD-PLAIN-FOREST, SHRUB-CARR, ASH-SWAMP, and other wet, mucky situations.

LEMNACEAE **Duckweed Family**

Lemna minor L.
Lesser Duckweed
Common. Lakeshores, SHRUB-SWAMP, and floating in open water.

Lemna trisulca L.
Star Duckweed
Common. Same places as *L. minor*, but apparently more common in alkaline situations.

Lemna valdiviana Phil.
Extinct. Collected by the Haneses from near the Fox and Beers Mill in section 26 of Prairie Ronde Tp. in stagnant water associated with *Chara* sp., *L. minor, L. trisulca*, and *Wolffia columbiana*. Probably adventive. Last collected by the Haneses on 16 November 1945.

Spirodela polyrhiza (L.) Schleiden
Greater Duckweed
Common. Wet mud on lakeshores, and floating in EM-MARSH. Usually found in areas sheltered from wave action. Sometimes covers the surface of stagnant ponds.

Wolffia columbiana Karsten
Water Meal
Common. EM-MARSH alongside streams, ponds, BOG moats, and at the edges of rivers and lakes. In similar situations as *W. punctata*, but more common.

Wolffia punctata Griseb.
Water Meal
Common. In situations like those favored by *S. polyrhiza* and *W. columbiana*.

XYRIDACEAE **Yellow-eyed-grass Family**

Xyris difformis Chapman **Hanes:** *X. caroliniana*
Rare. Wet depressions in open BOG at Bishop's Bog in Portage Tp. and LeFevre Bog in Climax Tp. Collected by the Haneses and by the first botanical survey from peaty sand on the S and E shores of Austin Lake in an area once dominated by COASTAL-PLAIN-MARSH, open OAK-HARDWOOD-FOREST, and sandy WET-PRAIRIE and oak savanna (Hermann 1936). No longer known from Austin Lake.

Xyris torta Sm.
Very rare. Collected by the Haneses from COASTAL-PLAIN-MARSH at Eagle, Pretty, and Pine Island Lakes. Only known to persist at Pretty Lake.

ERIOCAULACEAE **Pipewort Family**

Eriocaulon septangulare With.
Pipewort
Occasional. EM-MARSH.

COMMELINACEAE **Spiderwort Family**

Commelina communis L.
Common. RR rights-of-way, waste places, and cultivated fields. Widely established.

Tradescantia ohiensis Raf.
Glaucous Spiderwort
Common. RR rights-of-way, BLACK-OAK-BARREN, and WHITE-OAK-SAVANNA. Usually in sand.

PONTEDERIACEAE **Pickerel-weed Family**

Heteranthera dubia (Jacq.) MacM.
Water Star-grass
Occasional. SUB-MARSH. Often seen flowering in mud along receding lakeshores.

Pontederia cordata L.
Pickerel-weed
Common. SUB-MARSH and EM-MARSH.

JUNCACEAE **Rush Family**

Several species are reported here based upon annotations made to specimens in the WMU Hanes herbarium by E. G. Voss.

Juncus dichotomus var. *platyphyllus* has been reported from Kalamazoo County but is not included here. "A collection by F. J. Hermann and C. R. Hanes from Kalamazoo County (E side of Austin Lake, 9 July 1937, WMU) may be this poorly understood taxon, according to F. J. Hermann" (Voss 1972). The location of the collection was then dominated by COASTAL-PLAIN-MARSH, open OAK-HARDWOOD-FOREST, and sandy WET-PRAIRIE and oak savanna. Most of the area has since been thoroughly destroyed. I have chosen not to separate these specimens from *J. tenuis* and *J. dudleyi* with which *J. dichotomus* is often included, based upon my interpretation of material at MICH and WMU and discussions with A. A. Reznicek and E. G. Voss.

Juncus acuminatus Michaux
Common. SHRUB-SWAMP and EM-MARSH.

Juncus balticus Willd.
Current status uncertain. Mostly in the W½ of the county in EM-MARSH. Usually associated with sandy substrates.

Juncus biflorus Ell.
Current status unknown. Collected by the Haneses from wet, open to thinly wooded meadows, marshes, and lakeshores, on peaty sand "near the bank of Vicksburg Creek," on the E shore of Austin Lake, in section 14 of Oshtemo Tp., and in section 18 of Texas Tp. (Hanes 1939).

Juncus brachycephalus (Engelm.) Buch.
Current status unknown. Collected by the Haneses from a "swampy meadow," a "swamp," and along a "lakeshore" (at least some of these sites are in FEN sedge meadow).

Juncus bufonius L.
Toad Rush
Current status uncertain. Known only from a Hanes collection from the "W shore of Deep Point, Long Lake."

Juncus canadensis La Harpe
Current status uncertain. EM-MARSH.

Juncus dudleyi Wieg. **Hanes:** *J. tenuis* var. *dudleyi*
Current status unknown. Similar to *J. tenuis*, and often lumped with it. Collected by the Haneses from "marshes" in the S½ of the county.

Juncus effusus L.
Current status uncertain. SHRUB-SWAMP and EM-MARSH.

Juncus greenei Oakes & Tuckerman
Current status uncertain. Collected by the Haneses from the S shore of Eagle Lake, from near West Lake, and from the E shore of Austin Lake on "old sand dunes" (open dry and sandy OAK-HARDWOOD-FOREST and oak savanna).

Juncus marginatus Rostk.
Current status unknown. Reportedly "scarce" and "infrequent" on sandy lakeshores.

Juncus nodosus L.
Current status uncertain. SUB-MARSH and EM-MARSH.

Juncus pelocarpus Meyer
Current status unknown. Collected by the Haneses mostly from sandy "swamps" and "lakeshores" in the W½ of the county.

Juncus scirpoides Lam.
Current status uncertain, very rare if still extant. Collected by the Haneses from the E and SW shores of Austin Lake on "old sand dunes." Also collected by L. A. Kenoyer from a "sandy lakeshore" at Pine Island Lake in 1930. The area surrounding Austin Lake has been heavily developed since the last date of collection, and the status of this species at Pine Island Lake is uncertain. At both sites the substrate was sand or peaty sand (Hanes 1939).

Juncus tenuis Willd.
Path Rush
Common. A diversity of relatively open situations.

Juncus torreyi Cov.
Current status uncertain. Once "infrequent" along the sandy shore of Crooked Lake and in a "marsh" at Frank Reid's S of Vicksburg (Hanes & Hanes 1947).

Luzula acuminata Raf.
Wood Rush
Current status uncertain. Collected by the Haneses from an "oak wood on the bank of a small brook at Cooper's Glenn."

Luzula multiflora (Retz.) Lej.
Occasional. SUGAR-MAPLE-FOREST and OAK-HARDWOOD-FOREST.

LILIACEAE **Lily Family**

A specimen of *Camassia scilloides* (Raf.) Cory (Wild-hyacinth) is in the A. C. Roberts collection (KVM). I have excluded this species from the annotated checklist because the specimen bears no useful collection data and because some of Roberts specimens are of cultivated plants. It should be noted however that most of Roberts specimens were collected from near the Kalamazoo River (including floodplain forest) which is a known habitat for *Camassia scilloides* elsewhere in Michigan.

Aletris farinosa L.
Colic-root; Stargrass
Rare. Once relatively common primarily in the W½ of the county in sandy WET-PRAIRIE and ecotone. Sometimes associated with COASTAL-PLAIN-MARSH (Hanes & Hanes 1947). Now more limited in distribution and less common in the same places due to fire suppression and loss of lakeshore and wetland plant communities. Often associated with other uncommon and unusual plants.

Allium burdickii (Hanes) G. N. Jones **Hanes:** *A. tricoccum* var. *burdickii*
Differs from *A. tricoccum* in having the petioles and sheaths white or green instead of reddish and the leaves lanceolate rather than elliptical in outline. This species also flowers earlier and is smaller than typical *A. tricoccum* with which it is included by some authors (including Voss 1972) as *A. tricoccum* var. *burdickii*. I am not aware of specimens from Kalamazoo County with characters intermediate between the two. The Haneses studied these species in the field, and described *A. burdickii* as a variety of *A. tricoccum* (*A. tricoccum* var. *burdickii* in Hanes & Hanes 1947). Currently *A. burdickii* is occasional in SUGAR-MAPLE-FOREST only in the W tier of townships in Kalamazoo County (Hanes 1953; Hanes & Ownbey 1946; Jones 1979).

Allium canadense L.
Wild Garlic
Occasional. Disturbed ground including RR rights-of-way, roadsides, and old fields.

Allium cernuum Roth
Nodding Wild Onion
Current status uncertain, very rare if still extant. Reported by the Haneses to be "rare" near the S shore of Hampton Lake.

Allium sativum L.
Garlic
Current status uncertain. Roadsides and other waste places. Not native.

Allium tricoccum Aiton
Wild Leek; Ramps
Common. SUGAR-MAPLE-FOREST and OAK-HARDWOOD-FOREST.

Allium vineale L.
Field Garlic
Current status uncertain. Sandy old fields. Not native.

Asparagus officinalis L.
Garden Asparagus
Common. Roadsides and fencerows. Widely established.

Convallaria majalis L.
Lily-of-the-valley
Common. An escape from cultivation, usually in light shade.

Erythronium albidum Nutt.
White Trout Lily
Very rare. Collected by the Haneses from along the Kalamazoo River in section 27 of Comstock Tp. (pointed out by H. R. Becker), and W of Schoolcraft from the "Island woods" (a rich SUGAR-MAPLE-FOREST). Still common in the "Island woods." The Kalamazoo River through section 27 of Charleston Tp. has been extensively altered. It is highly unlikely that this species persists at this site.

Erythronium americanum Ker
Yellow Adder's Tongue
Common. SUGAR-MAPLE-FOREST, FLOODPLAIN-FOREST, and OAK-HARDWOOD-FOREST.

Hemerocallis fulva (L.) L.
Orange Day-lily
Occasional. Roadsides and other disturbed situations. Frequently persists on old homesites and elsewhere where previously cultivated.

Hemerocallis lilio-asphodelus L.
Yellow Day-lily; Lemon-lily
Current status unknown. Not in Hanes & Hanes (1947).

Lilium michiganense Farw.
Michigan Lily
Rare. WET-MEADOW and SHRUB-CARR.

Lilium philadelphicum L.
Wood Lily
Very rare. Collected by the Haneses from along wetland edges with WHITE-OAK-SAVANNA, BUR-OAK-SAVANNA, and BLACK-OAK-BARREN. Also collected from an "oak wood", where it is no longer known. Only two small populations are known to persist, one in disturbed WHITE-OAK-SAVANNA near Sugarloaf Lake, and the other in disturbed BUR-OAK-SAVANNA along the former right-of-way of the MI Central RR just W of the WMU campus.

Maianthemum canadense Desf.
Wild or False Lily-of-the-valley; Canada Mayflower
Common. RED-MAPLE-SWAMP, TAMARACK-SWAMP, ASH-SWAMP, and BOG.

Medeola virginiana L.
Indian Cucumber-root
Occasional. TAMARACK-SWAMP, RED-MAPLE-SWAMP, and SUGAR-MAPLE-FOREST.

Muscavi botryoides (L.) Miller
Current status unknown. Not native.

Ornithogalum nutans L.
Rarely escaped. Often long persistent where planted. Not in Hanes & Hanes (1947).

Ornithogalum umbellatum L.
Star-of-Bethlehem
Current status unknown. A rare and local escape from cultivation. Often long persistent where planted.

Polygonatum biflorum (Walter) Ell. **Hanes:** *P. commutatum*
Smooth Solomon's-seal
Occasional. SUGAR-MAPLE-FOREST, OAK-HARDWOOD-FOREST, and on forest edges along roadsides. Sometimes seen beneath solitary pasture oaks and hickories, and in fencerows.

Polygonatum pubescens (Willd.) Pursh
Hairy Solomon's-seal
Occasional. SUGAR-MAPLE-FOREST and OAK-HARDWOOD-FOREST.

Smilacina racemosa (L.) Desf.
False Spikenard
Rare. Hilly SUGAR-MAPLE-FOREST and OAK-HARDWOOD-FOREST (Hanes 1945b).

Smilacina stellata (L.) Desf.
Starry False Solomon's-seal
Occasional. A diversity of open and lightly wooded swampy situations including RED-MAPLE-SWAMP and TAMARACK-SWAMP.

Smilacina trifolia (L.) Desf.
Three-leaved Solomon's-seal
Current status uncertain. Collected by the Haneses from a "wooded swamp" S of Vicksburg and from a "boggy swamp" S of Butterfield Lake in section 30 of Ross Tp.

Smilax ecirrhata (Kunth) S. Watson
Carrion-flower
Occasional. A diversity of open and wooded situations including RED-MAPLE-SWAMP, FEN, SUGAR-MAPLE-FOREST, and FLOODPLAIN-FOREST.

Smilax herbacea L.
Carrion-flower
Very rare. Along wooded terrestrial roadsides and in hilly OAK-HARDWOOD-FOREST, mostly in the S½ of the county.

Smilax illinoensis Mangaly
Carrion-flower
Current status uncertain. Collected by the Haneses from along a RR right-of-way through EMERGENT-MARSH in section 20 of Prairie Ronde Tp., from a wetland in section 7 of Wakeshma Tp., and from along the Kalamazoo River E of Galesburg. Included in the Haneses' (1947) *S. herbacea* var. *lasioneura*.

Smilax lasioneura Hooker
Carrion-flower
Occasional. Roadsides and openings in SUGAR-MAPLE-FOREST, HARDWOOD-SWAMP, and RED-MAPLE-SWAMP. Included in the Haneses' (1947) *S. herbacea* var. *lasioneura.*

Smilax rotundifolia L.
Common Greenbriar
Occasional. NW¼ of county growing in OAK-HARDWOOD-FOREST, and BLACK-OAK-BARREN.

Smilax tamnoides L. **Hanes:** *S. hispida*
Bristly Greenbriar
Current status uncertain. OAK-HARDWOOD-FOREST, especially near wetlands. Not in Hanes & Hanes (1947).

Tofieldia glutinosa (Michaux) Pers.
False Asphodel
Occasional. FEN and probably a former component of WET-PRAIRIE.

Trillium cernuum L.
Nodding Trillium
Rare. RED-MAPLE-SWAMP, ASH-SWAMP, TAMARACK-SWAMP, and FLOODPLAIN-FOREST.

Trillium erectum L.
Stinking Benjamin
Current status uncertain, very rare if still extant. A specimen at KVM labeled "April 1896" may be from Kalamazoo County, but lacks locality data. A specimen originally labeled as *T. flexipes*, was collected by P. W. Thompson in 1964 from "boggy swamp forest" (RED-MAPLE-SWAMP) N of Sugarloaf Lake in section 32 of Portage Tp. (BLH). The petals and ovaries are white, the styles purple, and the filaments are unusually long. This may be an albino form of *T. erectum*, but I am doubtful since the area has been botanized for more than 100 years during which time no other potential specimens of *T. erectum* have been seen. A specimen collected on 22 May 1932 by R. Olmsted from the "bank of the Kalamazoo River in moist woods" may have been collected in Kalamazoo County, but lacks convincing locality data. I know of no unequivocal records, but have included this species here on the authority of Voss (1972). Not in Hanes & Hanes (1947).

Trillium flexipes Raf.
Drooping Trillium
Occasional. HARDWOOD-SWAMP, RED-MAPLE-SWAMP, and TAMARACK-SWAMP.

Trillium grandiflorum (Michaux) Salisb.
Common Trillium
Common. SUGAR-MAPLE-FOREST, OAK-HARDWOOD-FOREST, FLOODPLAIN-FOREST, and RED-MAPLE-SWAMP.

Trillium sessile L.
Toadshade
Very rare. HARDWOOD-FOREST in the E½ of the county. The larger of the two populations known grows in disturbed HARDWOOD-SWAMP near a channelized stream on clay loam SW of Fulton. The canopy is dominated by *Acer rubrum, Carpinus caroliniana, Fraxinus americana, Populus deltoides,* and *Zanthoxylum americanum.* Associated herbs included *Floerkea proserpinacoides, Hydrastis canadensis*, *Isopyrum biternatum, Panax quinquefolius,* and *Podophyllum peltatum. Hydrastis canadensis* and *P. quinquefolius* were planted here in the 1950s (K. Chapman, MNFI Site Survey Report 1980).

Uvularia grandiflora Sm.
Bellwort
Occasional. SUGAR-MAPLE-FOREST and OAK-HARDWOOD-FOREST.

Yucca filamentosa L.
Yucca; Adam's-needle
Rarely escaped. Dry sandy soil of BLACK-OAK-BARREN, roadsides, and in a prairie planting at the intersection of Oakland Drive and I-94.

Zigadenus glaucus (Nutt.) Nutt.
White Camas
Rare. Overgrown former oak savanna and prairie FEN. Probably once modal in moist oak savanna, prairie, and prairie FEN.

DIOSCOREACEAE **Yam Family**

Dioscorea villosa L.
Wild Yam
Occasional. OAK-HARDWOOD-FOREST edges.

AMARYLLIDACEAE **Amaryllis Family**

Hypoxis hirsuta (L.) Cov.
Star-grass
Occasional. FEN.

Narcissus pseudonarcissus L.
Daffodil
Occasional. A diversity of open and wooded disturbed situations. May only persist where once planted.

IRIDACEAE **Iris Family**

Belamcanda chinensis (L.) DC.
Blackberry-lily
Current status unknown. Once known as an escape from cultivation, but may have only persisted where once planted (Hanes & Hanes 1947). Still widely cultivated.

Iris germanica L.
Flag; Fleur-de-lys
Rarely seen outside of cultivation. May only persist where once planted.

Iris pseudacorus L.
Yellow Flag
First collected by the Haneses in 1947 from a creek S of the Kalamazoo River in the E½ of section 25 of Ross Tp., and from N of the Kalamazoo River along "Sevenmile Creek" in section 24 of Ross Tp. Now occasional in the NE¼ of the county, actively invading wet depressions in FLOODPLAIN-FOREST, shady streamsides, and other wet areas (Meagher & Tonsor 1992). Not native. Not in Hanes & Hanes (1947).

Iris virginica L.
Southern Blue Flag
Common. Open swampy situations including WET-MEADOW and WET-PRAIRIE.

Sisyrinchium albidum Raf.
White Blue-eyed Grass
Rare. Collected by the Haneses from FEN, WET-PRAIRIE, and TERRESTRIAL-PRAIRIE. No longer known from TERRESTRIAL-PRAIRIE.

Sisyrinchium angustifolium Miller **Hanes:** *S. graminoides*
Stout Blue-eyed Grass
Rare. WET-PRAIRIE and lightly wooded HARDWOOD-SWAMP associated with FEN.

ORCHIDACEAE (Bingham 1939; Case 1987) **Orchid Family**

The orchids of Kalamazoo County have been especially well-studied. The Haneses were fanciers of the Orchidaceae, and the orchids were the subject of my initial fascination with the local flora. For these reasons I have covered the Orchidaceae in rather more detail than other plant families. At least four native orchids are now probably extinct and several others are nearing extinction or may already be gone, but data sufficient to document their absence are lacking. Deer appear to have an important, detrimental effect on at least a few native species. Fire suppression is certainly a factor affecting several others. The richest region in Kalamazoo County for orchids is undoubtedly an approximately one-mile square area in the Gourdneck State Game Area in which at least 27 species of orchids have been collected or observed (not all still extant).

Aplectrum hyemale (Willd.) Torrey
Puttyroot; Adam-and-Eve
Rare. SUGAR-MAPLE-FOREST. More frequent and abundant in relatively open, lightly disturbed forest than in the shade of old, large trees. Curiously absent from many superficially intact former localities.

Arethusa bulbosa L.
Arethusa; Dragon's Mouth
Very rare. *Sphagnum* hummocks near open water in BOG. Four separate populations have been known in Kalamazoo County, two of which are known to be extant. I discovered this species in 1995 in seepage BOG in the Gourdneck State Game Area (Portage Tp.). This is the first report of *A. bulbosa* from the Gourdneck State Game Area. It may be recently adventive at the site, or just previously overlooked (it is very local here and in an exceptionally difficult area to access). Another extant site occurs in a lakeside BOG in Portage Tp. (not reported by the Haneses). Collected by Florence Hanes as early as 1891 at Mud (Veley) Lake, (Alamo Tp.). Last observed here by the Haneses on 4 June 1940 (Hanes 1950). The current status of this site is unknown. Collected on 28 May 1879 and 17 June 1880 by A. C. Roberts "four mi. E of Kalamazoo" (KVM). On one specimen Roberts later wrote "no longer found here".

Calopogon tuberosus (L.) BSP. **Hanes:** *C. pulchellus*
Grass-pink
Occasional. Wet depressions in BOG and in FEN sedge meadow.

Coeloglossum viride (L.) Hartman **Hanes:** *Habenaria viridis* var. *bracteata*
Bracted Orchid
Very rare. RED-MAPLE-SWAMP and TAMARACK-SWAMP in the S½ of the county. I observed a solitary plant in bud, growing in TAMARACK-SWAMP near Flowerfield Creek in Prairie Ronde Tp. in 1997. When I returned a week later, I found that the plant had been broken off a few inches above ground level.

Corallorhiza maculata Raf.
Spotted Coral-root
Rare. OAK-HARDWOOD-FOREST.

Corallorhiza odontorhiza (Willd.) Nutt.
Fall Coral-root
Rare. Rich HARDWOOD-SWAMP near FEN and BOG.

Corallorhiza trifida Chat.
Early Coral-root
Extinct. Collected by the Haneses from RED-MAPLE-SWAMP at the S end of Little Sugarloaf Lake. No other sites have ever been known. The forest at this site has since been clear-cut (1995) and local hydrology seriously altered by road construction and other significant disturbances. *Corallorhiza trifida* was last seen here by the Haneses on 15 May 1946.

Cypripedium acaule Aiton
Moccasin Flower; Pink or Stemless Lady-slipper
Occasional. SHRUB-CARR, BOG, FEN, and rarely in young pine plantations and disturbed former oak savanna.

Cypripedium calceolus L.
Yellow Lady-slipper
Occasional. TAMARACK-SWAMP, SHRUB-CARR, RED-MAPLE-SWAMP, seepage BOG, and FEN. Specimens similar to the variety known as *pubescens* (Large Yellow Lady-slipper) are much more common than specimens resembling var. *parviflorum* (Small Yellow Lady-slipper). I do not see a clear distinction between the two vars. in Kalamazoo County. Specimens exhibiting ecological and morphological characters that span the range of those considered characteristic of each variety are known.

Hybrids between the purported var. *pubescens* and *C. candidum* (named *Cypripedium ×andrewsii*) were collected by the Haneses E of Sugarloaf Lake at the "Beaver Dam." This site has since been altered and heavily disturbed, and I have not been able to find any plants here in several years of visits to the area. I recently located a site for this hybrid elsewhere in the Sugarloaf Lakes Region (in the Gourdneck State Game Area) growing in the vicinity of both putative parents. At this site hybrid plants take on almost all intermediate shades imaginable between the colors of their putative parents, including an attractive "buff" color. Most of the plants also appear to be intermediate between their parents in stem and leaf morphology, choice of substrate, and lighting conditions (Case 1993; Klier et al. 1991). This is likely the only extant hybrid population remaining in Kalamazoo County. In my opinion this hybrid population is the result of encroachment of SHRUB-CARR (with associated *C. calceolus*) into prairie FEN meadow (habitat for *C. candidum*) due to fire suppression.

Cypripedium candidum Willd.
White Lady-slipper
Rare in FEN. Declining, and nearly extinct at several sites, primarily due to fire suppression and subsequent shading by shrubs and trees. Known to hybridize with *C. calceolus* (var. *pubescens*) forming the named hybrid, *Cypripedium ×andrewsii* (see *C. calceolus*). This plant has been known from at least nine distinct former sites in Kalamazoo County. It was known to be extant at five of these sites

as of 1996 (three of which are in the Gourdneck State Game Area), but few stems remain at these sites. Clearly, hydrologic changes, fire supression, and potentially other factors are rapidly taking their toll on this once relatively common orchid.

Cypripedium reginae Walter
Showy Lady-slipper
Rare. TAMARACK-SWAMP, RED-MAPLE-SWAMP, and SHRUB-CARR. I observed a single clump with 53 flowers in Portage Tp. in 1995.

Epipactis helleborine (L.) Crantz
Helleborine
Rare. Disturbed forest. First collected in Kalamazoo County by R. W. Pippen in 1987 near the Kellogg Biological Station and now occasionally encountered throughout the N½ of the county. Most southern location known to date is at the base of a hill on the NE edge of Asylum Lake (observed by the author in September 2002). Locally established and spreading. Not native. Not in Hanes & Hanes (1947).

Goodyera pubescens (Willd.) R. Br.
Downy Rattlesnake Plantain
Rare. Sandy second growth HARDWOOD-SWAMP and RED-MAPLE-SWAMP. Few plants are usually found in a given location. Rarely flowers in Kalamazoo County. Known only from Alamo, Portage, and Schoolcraft Tps. A collection made by the first botanical survey is without locality data.

Isotria verticillata (Willd.) Raf.
Whorled Pogonia
Current status uncertain, very rare if still extant. Collected by the Haneses from *Sphagnum* BOG in the vicinity of the Sugarloaf Lakes. Last observed by C. R. Hanes in the "tamarack swamp" (actually a BOG) "on the E side of Sugarloaf Lake" in 1947 (Figure 2). This site has since been partially flooded and otherwise altered so thoroughly that no significant BOG remains. The plants grew in deep *Sphagnum* moss. Also collected by C. R. Hanes from open *Sphagnum* BOG on the border of tamaracks on the E edge of Mud Lake (Portage Tp.). This site has since been destroyed by residential development and draining. I have been unable to locate plants in dozens of spring and early summer trips to the area over four years (1996–1999). Much formerly open BOG in the Sugarloaf Lakes region has been overgrown by shrubs, *Typha* spp., and Purple Loosestrife, perhaps facilitated by highway construction and other development and exploitation that has seriously altered the hydrology of the region over the last 60 years (C. R. Hanes notes).

Liparis liliifolia (L.) Lindley
Purple Twayblade
Rare. SHRUB-CARR, RED-MAPLE-SWAMP, and a diversity of other shaded situations including under shrubs in dry brushy old fields. Probably not originally native here (although known long ago from other parts of S Lower Michigan). Our plants are likely the result of a recent range change/extension, or at the very least an increase in local population density. First collected in Kalamazoo County in 1993 by P. Olexia (Kalamazoo College) (specimen remains unmounted at WMU). In some places, such as the Arcadia property owned by WMU, *L. liliifolia* is common, and regularly sets fruit. Here, plants grow abundantly in moss beneath *Cornus* and other shrubs in dry soil in old agricultural fields. Capsule development was rare at all sites visited from 1995–2002, but the Arcadia property has consistently been a notable exception (although not visited since 1999). Not only is this the largest single population known in Kalamazoo County (hundreds of plants), but also, most plants develop capsules. I have observed and/or collected specimens from at least ten sites widely scattered throughout the county.

Liparis loeselii (L.) Richard
Loesel's or Green Twayblade; Fen Orchid
Occasional. FEN, BOG, TAMARACK-SWAMP, SHRUB-CARR, and RED-MAPLE-SWAMP, usually on "hummocks" near open water.

FIGURE 2. This photograph of *Isotria verticillata* was taken by the Haneses at Sugarloaf Lake. It appears as Plate 13 in "Orchids of Michigan" (Bingham 1939).

Malaxis monophylla (L.) Sw. **Hanes:** *M. brachypoda*
White Adder's-mouth
Current status uncertain. Collected by the Haneses from RED-MAPLE-SWAMP/BOG E of Sugarloaf Lake (Portage Tp.) where it grew on decaying wood with mosses. Also known from a "swamp" N of Mud Lake, Pavilion Tp. Both former localities are in the S½ of the county. No extant populations are known with certainty. However, this diminutive plant is easily overlooked, and despite the great number of unsuccessful trips I have made to search for it in the Sugarloaf Lakes region, and the changes that have occurred to the forest and wetlands at this site, it may still be extant. I have only once looked (unsuccessfully) for this plant at Mud Lake (Pavilion Tp.).

Orchis spectabilis L.
Showy Orchis
Rare. Collected by the Haneses from rich SUGAR-MAPLE-FOREST throughout the county. Now absent from many former sites. It is unclear why this species and *Aplectrum hyemale*, both denizens of rich SUGAR-MAPLE-FOREST, have apparently disappeared from much of their former ranges in Kalamazoo County despite the persistence of much superficially suitable habitat. The Haneses make mention in their notes that this species was even then becoming rare. Anecdotal evidence suggests that deer may be involved.

Platanthera ciliaris (L.) Lindley **Hanes:** *Habenaria ciliaris*
Orange Fringed Orchid
Very rare. Collected by the Haneses from BOG and sandy, seasonally moist to wet prairie. Now extirpated from prairie and rare in BOG where only two of at least five former sites currently support plants (one in Portage Tp., and another in Climax Tp.). Human-induced changes in water level and/or heavy shrub growth have apparently destroyed the other former bog sites. At both extant bog sites large numbers of small plants suggest successful reproduction. At a Portage Tp. site a small number (1–2% in 1999) of the flowering plants in any given year have their corms damaged or destroyed by rodents (pers. obs.). Characteristically, these damaged plants have a small (approx. two inch diameter) hole in the *Sphagnum* moss at their bases, and the plants are partially, or wholly toppled, and dead or dying. First collected by John Wright of the first botanical survey on 30 July 1838 in peaty sand (sandy WET-PRAIRIE) at Austin Lake. Collected more than 100 years later by the Haneses at this same site, but the site has since been destroyed by lakeside development. Reacts quite favorably to shrub and tree cutting and removal (observed at both remaining BOG sites).

Platanthera clavellata (Michaux) Luer **Hanes:** *Habenaria clavellata*
Club-spur Orchid
Occasional. RED-MAPLE-SWAMP and adjacent TAMARACK-SWAMP, SHRUB-CARR, and seepage BOG, only near Barton Lake and the Sugarloaf Lakes. The reason for this peculiar distribution is unclear, but may be associated with the distribution of present and former RED-MAPLE-SWAMP (the primary habitat for this species here). Only a small number of the plants present bloom in a given year.

Platanthera dilatata (Pursh) Lindley ex Beck **Hanes:** *Habenaria dilatata*
Tall White Bog Orchid
Rare. FEN sedge meadow. A marly FEN sedge meadow in the Gourdneck State Game Area reported by the Haneses to have more than 130 blooming stems in 1935, had a comparable number of blooming stems in 1996.

The hybrid *P. dilatata* × *P. hyperborea* is known from the Sugarloaf Lakes Region. It usually has greenish flowers with the lip more or less dilated. The Haneses collected specimens on 9 June 1933 from "wooded swamps" at Sugarloaf Lake that were referred to this hybrid by Voss (1972). I have seen a few potential hybrids in open RED-MAPLE-SWAMP and in man-made clearings near the S margin of Little Sugarloaf Lake.

Platanthera flava (L.) Lindley **Hanes:** *Habenaria flava*
Tuberculed Orchid
Very rare. Rich, sandy SHRUB-CARR (former WET-PRAIRIE), and sandy WET-PRAIRIE in the W½ of the county. All specimens are of the var. *herbiola*.

Platanthera hookeri (Torrey) Lindley
Hooker's Orchid
Extinct. Known only from a collection made by A. C. Roberts on 30 May 1879 (KVM). The Haneses were not aware of this collection prior to the publication of their 1947 flora, but report it in Hanes 1950. The only specimen known reads only "Cooper," but Cooper Tp. is within the area botanized by Roberts, and the specimen is considered by the Haneses to have been collected in Kalamazoo County; therefore, despite the lack of decisive label data, I have tentatively included this species here. Not in Hanes & Hanes (1947).

Platanthera hyperborea (L.) Lindley **Hanes:** *Habenaria hyperborea*
Tall Northern Bog Orchid
Rare. Boggy WET-MEADOW, RED-MAPLE-SWAMP, and TAMARACK-SWAMP.

Platanthera lacera (Michx.) G. Don in Sweet **Hanes:** *Habenaria lacera*
Ragged Fringed Orchid
Rare. Seepage BOG and disturbed ecotone at the interface of forest and wetland. Also known from TERRESTRIAL-PRAIRIE along a RR right-of-way through Prairie Ronde, and from Harris Prairie in Alamo Tp.

Platanthera leucophaea (Nutt.) Lindley **Hanes:** *Habenaria leucophaea*
Prairie Fringed Orchid
Extinct. Collected by the Haneses from hummocks of grass and sedge along the margin of Sugarloaf Lake (F. W. Case Jr. pers. comm.) (also, see Figure 3). Water levels have been altered in the Sugarloaf Lakes region since the plant was last seen, and the Hanes make mention of its decline at this site, perhaps due to hydrological changes (Hanes 1950). A record from 4 mi. E of Kalamazoo dated 4 July 1885 (A. C. Roberts, KVM) reads "only specimen I ever saw". Collected in 1838 from Kalamazoo County by the first botanical survey (NY). May once have occurred W of Sugarloaf Lake in seasonally wet depressions on Prairie Ronde and elsewhere in wet to mesic prairies.

Platanthera orbiculata (Pursh) Lindley **Hanes:** *Habenaria orbiculata*
Round-leaved Orchid
Current status uncertain, very rare if still extant. Collected by the Haneses and by F. W. Rapp from depressions in rich woods (probably SUGAR-MAPLE-FOREST) in several places in the S½ of the county. The Haneses report in their notes in 1934 that they feared they may have collected the last of this species in the county when they dug a specimen in the spring of 1933 and matured it to flowering in their home in a saucer before pressing it for their herbarium. They report the species as "never being very common with us."

Platanthera psycodes (L.) Lindley **Hanes:** *Habenaria psycodes*
Purple Fringed Orchid
Rare. SHRUB-CARR, FEN, WET-MEADOW, and open mucky lakeshores.

Pogonia ophioglossoides (L.) Ker
Rose Pogonia
Occasional. BOG and acid microclimates in FEN.

Spiranthes cernua (L.) Rich.
Nodding Ladies'-tresses
Common. FEN, moist to wet ecotone separating forest and wetland, old fields, and generally just about anywhere with relatively moist soil and in medium to full sun.

Spiranthes lacera (Raf.) Raf.
Slender Ladies'-tresses
Extinct. Reported by C. Hanes (1950) as *S. gracilis* (Bigel.) Beck, based on two specimens collected by A. C. Roberts from oak savanna along the MI Central RR right-of-way 2.5 mi. SW of Kalamazoo, 11 August 1902 (KVM). This is probably the same area where Frank H. Tuthill made a collection in the early 1870s (Hanes 1950; Tuthill 1876). Not in Hanes & Hanes (1947).

Spiranthes lucida (H. H. Eaton) Ames
Shining Ladies'-tresses
Very rare. Known only from a FEN sedge meadow in Charleston Tp. First collected by S. Grund (281 MSC) 7 June 1994. Associated with *Potentilla fruticosa, Carex tetanica, C. leptalea, C. hystricina*, and *Thelypteris palustris*. Not in Hanes & Hanes (1947).

Spiranthes ochroleuca (Rydberg) Rydberg
Very rare. Known only from a collection made by T. Trana 30 September 1993 from "slightly moist

FIGURE 3. This photograph of *Platanthera leucophaea* was taken by the Haneses at Sugarloaf Lake. It appears as Plate 11 in "Orchids of Michigan" (Bingham 1939). Many such sites near the Sugarloaf Lakes are now dominated by *Phragmites, Typha,* and *Lythrum salicaria*.

sand" of shady OAK-HARDWOOD-FOREST in the NE¼ of the county (18746 MICH). Associated with *Acer rubrum, Asplenium platyneuron, Botrychium multifidum*, *Carya* sp., *Quercus velutina,* and *Sassafrass albidum*. Not in Hanes & Hanes (1947).

Spiranthes ovalis Lindley
Rare. Collected by R. W. Pippen for the first time in the county and in the state, at the Kellogg Forest, Ross Tp. on 7 October 1966. Also known from WET-MEADOW and OAK-HARDWOOD-FOREST, but only in the NE¼ of the county. Not in Hanes & Hanes (1947).

Spiranthes romanzoffiana Cham.
Hooded Ladies'-tresses
Current status uncertain, very rare if still extant. Not recently collected or observed. Sometimes attributed to Kalamazoo County based on a collection made by J. A. Niewland SE of Bankson Lake (MICH). The actual location of this collection is unclear, but may be in Van Buren County. I have included it here tentatively on the authority of Voss (1972).

Spiranthes tuberosa Raf.
First collected by B. Stergios (MSC), on 9 August 1969 from "Louden old field" in Section 5 Ross Tp. Collected by F. W. Case Jr. on 15 August 1980 from a hillside meadow S of Duck Lake (Ross

Tp.) in mossy, gravelly, sand (possibly the same site as the previous). He found a total of thirteen plants at the site. On 16 August 1980 almost 20 plants were located nearby in an old field. Collected by E. B. Pitcher on 25 August 1992 behind apartments at 1400 N Drake Rd. growing in "clay soil" in an old corn field. Associates were *Aster* spp., *Hieracium* sp., *Polytrichum* sp., and small *Betula papyrifera* saplings. Not in Hanes & Hanes (1947).

Spiranthes vernalis Engelm. & Gray
Current status uncertain, very rare if still extant. Not recently collected or observed. Collected on 2 June 1981 by H. E. Ballard and R. W. Pippen from the SE¼ of section 31 of Texas Tp. Habitat uncertain. No other collections are known. Not in Hanes & Hanes (1947).

Triphora trianthophora (Sw.) Rydb.
Nodding Pogonia; Three Birds Orchid
Extinct. Collected by the Haneses from a single site on a wet-mesic to mesic rise of less than ¼ acre in an otherwise acid and sandy, rich, second-growth HARDWOOD-SWAMP. According to the Haneses' notes the number of stems varied from year to year. Grazing, opening of the canopy by wood cutting, and the death of the single mature American Beech that stood more or less above the plants, may have destroyed this population (pers. obs.). The site is now relatively open and the ground is dominated locally by dense clumps of grasses and sedges. I was unable to find any plants in visits to the former site in 1996, 1997, or 1998. Last collected 8 August 1938 by the Haneses (Hanes 1939).

Dicotyledons

SAURURACEAE **Lizard's-tail Family**

Saururus cernuus L.
Lizard's-tail
Rare. FLOODPLAIN-FOREST and rich HARDWOOD-SWAMP in the E½ of the county.

SALICACEAE **Willow Family**

Several species are reported here based on annotations made to specimens at WMU by E. G. Voss (Voss 1985).

Populus alba L.
White or Silver Poplar
Rare. Roadsides, lawns, and waste places. Locally established.

Populus deltoides Marsh.
Cottonwood
Common. HARDWOOD-SWAMP, FLOODPLAIN-FOREST, and in a diversity of disturbed situations.

Populus grandidentata Michaux
Largetooth or Bigtooth Aspen
Common. Upland situations, especially old fields, OAK-HARDWOOD-FOREST, and SUGAR-MAPLE-FOREST.

Occasionally hybridizes with *P. tremuloides* forming the named hybrid *Populus ×smithii*.

Populus heterophylla L.
Swamp Cottonwood
Very rare. Collected by the Haneses from a swamp forest in Schoolcraft Tp. where it is still locally dominant. This is a male stand, reproducing by root-suckers. Some associates include *Acer rubrum, Carex crinita, Cephalanthus occidentalis, Dioscorea villosa, Dryopteris spinulosa, Fraxinus pensylvanica, Ilex verticillata, Pilea pumila, Quercus bicolor, Rubus alleghaniensis, Vaccinium corymbosum,* and *Vitis riparia* (Wagner et al. 1980).

Populus nigra L.
Lombardy Poplar
Current status unknown. Collected by the Haneses from lakeshores in the W½ of the county. Not native.

Populus tremuloides Michaux
Quaking Aspen
Common. Forming dense thickets in old fields and a diversity of other open and/or disturbed wet to mesic situations including wetlands. Known to hybridize with *P. grandidentata* forming the named hybrid *Populus ×smithii* (see *P. grandidentata*).

Salix alba L.
White Willow
Collected by the Haneses from several wet disturbed situations. Not native, Current status unknown. The hybrid *Salix ×rubens* (*S. alba* × *S. fragilis*) is known from Kalamazoo County.

Salix amygdaloides Andersson
Peach-leaved Willow
Current status unknown. SHRUB-CARR and associated FEN, usually near water.

Salix bebbiana Sarg.
Beaked or Bebb's Willow
Occasional. SHRUB-SWAMP, FEN, SHRUB-CARR, and WET-MEADOW, especially near the Sugarloaf Lakes, Gourdneck Lake, and Mud Lake (Portage Tp.).

Salix candida Willd.
Sage or Hoary Willow
Occasional. FEN, SHRUB-CARR, and WET-MEADOW.

Salix discolor Muhl.
Pussy Willow
Common. SHRUB-SWAMP, SHRUB-CARR, FEN, and WET-MEADOW.

Salix eriocephala Michaux **Hanes:** *S. rigida*
Current status uncertain. WET-MEADOW, FEN, and SHRUB-CARR.

Salix exigua Nutt. **Hanes:** *S. interior*
Sandbar Willow
Current status uncertain. Margins of lakes, ponds, and streams.

Salix fragilis L.
Crack or Brittle Willow
Rarely escaped. Usually along lakeshores. Known to hybridize with *S. alba* forming the named hybrid *Salix ×rubens* (see *S. alba*).

Salix humilis Marsh.
Upland or Prairie Willow
Occasional. Especially frequent in Oshtemo, Portage, Texas, and Schoolcraft Tps. in sandy former OAK-BARREN.

Salix lucida Muhl.
Shining Willow
Occasional. WET-MEADOW, WET-PRAIRIE, and other wet, open situations, usually with sandy substrates.

Salix myricoides Muhl. **Hanes:** *S. glaucophylloides*
Blue-leaf Willow

Occasional. COASTAL-PLAIN-MARSH on the sandy shores of Pretty, Pine Island, Pleasant, and Eagle Lakes.

Salix nigra Marsh.
Black Willow
Occasional. Depressions in HARDWOOD-SWAMP and FLOODPLAIN-FOREST.

Salix pedicellaris Pursh
Bog Willow
Current status uncertain. BOG.

Salix pentandra L.
Bay-leaved or Laurel Willow
Current status unknown. Collected by the Haneses from a "swamp E of Galesburg." Not native.

Salix petiolaris J. E. Smith **Hanes:** *S. gracilaris* var. *textoris* & *S. subsericia* (possibly a hybrid involving *S. sericea* & *S. petiolaris*)
Slender or Meadow Willow
Current status unknown. WET-MEADOW.

Salix purpurea L.
Basket or Purple-osier Willow
Current status unknown. Collected by the Haneses from lakeshores and other wetland margins. Not native.

Salix sericea Marsh.
Silky Willow
Current status unknown. Collected by the Haneses from "swampy soil" E of Crooked Lake, 2 mi. NW of Fulton, and from section 31 of Oshtemo Tp.

Salix serissima (Bailey) Fern.
Autumn Willow
Current status unknown. Collected by the Haneses from lightly wooded swampy situations including wet openings in TAMARACK-SWAMP and RED-MAPLE-SWAMP.

JUGLANDACEAE **Walnut Family**

Carya cordiformis (Wang.) K. Koch
Bitternut Hickory
Occasional. OAK-HARDWOOD-FOREST and SUGAR-MAPLE-FOREST.

Carya glabra (Miller) Sweet **Hanes:** *C. ovalis*
Pignut Hickory
Occasional. OAK-HARDWOOD-FOREST, BLACK-OAK-BARREN, and SUGAR-MAPLE-FOREST.

Carya laciniosa (Michaux f.) G. Don
Kingnut or Shellbark Hickory
Current status uncertain. Collected by the Haneses from HARDWOOD-SWAMP near streams in the E½ of the county. Last observed 1 October 1950 on the border between sections 29 and 32 of Brady Tp., near the Portage River. I searched unsuccessfully for this tree at the aforementioned site in 2002.

Carya ovata (Miller) K. Koch
Shellbark or Shagbark Hickory
Occasional. OAK-HARDWOOD-FOREST and disturbed oak savanna.

Juglans cinerea L.
Butternut

Rare. HARDWOOD-SWAMP, FLOODPLAIN-FOREST, and SUGAR-MAPLE-FOREST, mostly near the Kalamazoo River. Occasionally planted. No longer known from several historic localities, probably due to an introduced fungal pathogen (*Sirococcus clavigignenti-juglandacearum*) that causes butternut canker.

Juglans nigra L.
Black Walnut
Occasional. SUGAR-MAPLE-FOREST.

BETULACEAE **Birch Family**

Alnus rugosa (Duroi) Sprengel
Speckled Alder
Occasional. Stream margins in SHRUB-CARR, WET-MEADOW, and SHRUB-SWAMP.

Betula alleghaniensis Britton **Hanes:** *B. lutea*
Yellow Birch
Occasional. TAMARACK-SWAMP and an important component of RED-MAPLE-SWAMP. Rare outside of Portage, Prairie Ronde, and Schoolcraft Tps.

The hybrid *Betula ×purpusii* (*B. pumila × B. alleghaniensis*) was collected by the Haneses in section 24 of Texas Tp. (Hanes 1939). The current status of this hybrid is unknown.

Betula papyrifera Marsh.
Paper, White, or Canoe Birch
Locally established. BOG and diverse other wet open disturbed situations. Not in Hanes & Hanes (1947).

Betula pendula Roth.
European White Birch
Locally established. Old fields. Not in Hanes & Hanes (1947).

Betula pumila L.
Bog or Dwarf Birch
Common. BOG, SHRUB-CARR, TAMARACK-SWAMP, and FEN. Known to hybridize with *B. alleghaniensis* forming the named hybrid *Betula ×purpusii* (see *B. alleghaniensis*).

Carpinus caroliniana Walter
Hornbeam; Blue-beech
Occasional. Mature, relatively wet SUGAR-MAPLE-FOREST, FLOODPLAIN-FOREST, and occasionally in other kinds of forest, usually near wetlands, and almost always in heavy shade.

Corylus americana Walter
Hazelnut
Occasional. Once a locally important component of oak savanna, TERRESTRIAL-PRAIRIE, and open OAK-HARDWOOD-FOREST, especially near watercourses. The Haneses knew *C. americana* from fencerows, thickets, and streamsides. Today, this species is occasional throughout in remnants of the aforementioned prairie and savanna plant communities, and as occasional individuals along Flowerfield, Arcadia, and other creeks that pass through areas of former prairie and oak savanna.

Ostrya virginiana (Miller) K. Koch
Ironwood; Hop-hornbeam
Occasional. SUGAR-MAPLE-FOREST and OAK-HARDWOOD-FOREST.

FAGACEAE **Beech Family**

Hybrids between members of the genus *Quercus* are frequent and probably involve most of our native species, within their respective subgenera. Relatively few collections have been made of these

hybrids, most are difficult to identify, and few have been identified by experts. Therefore, I have not generally included hybrids in the treatments below.

Castanea dentata (Marsh.) Borkh.
Chestnut
Rare. A small tree was found by T. Robinson, and W. C. Van Deventer growing along a "logging trail" at the edge of a *Sphagnum* bog in the NW¼ of section 15 of Oshtemo Tp. in 1961 (Robinson 1963). They reported that the tree was connected to a below ground root larger than the trunk diameter of the small tree, but they were unable to locate a stump from which the root and hence the sprout could have grown. The tree was transplanted to an unspecified nearby location, and was reported to be "thriving" two years later. There are a few small trees growing in the Lilian Anderson Arboretum in Oshtemo Tp., and a small tree in the vicinity of an old dead tree on the R. Brewer property off 5th street in Oshtemo Tp. The introduced ascomycete fungus *Cryphonectria parasitica* causes Chestnut Blight, a disease that slowly kills the cambium and girdles chestnut trees (Brewer 1995). Not native. Not in Hanes & Hanes (1947).

Fagus grandifolia Ehrh.
Beech
Common. Well-drained SUGAR-MAPLE-FOREST. Beech bark disease has recently been found in Kalamazoo County and may have a significant impact on our remaining SUGAR-MAPLE-FORESTS.

Quercus alba L.
White Oak
Common in a diversity of upland situations. Formerly an important component of oak savanna, especially WHITE-OAK-SAVANNA. Several very large, perhaps original savanna trees, persist, especially in and around the city of Kalamazoo.

Quercus bicolor Willd.
Swamp White Oak
Occasional. RED-MAPLE-SWAMP, HARDWOOD-SWAMP, and FLOODPLAIN-FOREST. Appears to have been a local component of some poorly-drained oak savannas.

Quercus coccinea Muench.
Scarlet Oak
Rare. Dry, sandy, well-drained situations, especially very dry OAK-HARDWOOD-FOREST (sometimes called dry forest) and BLACK-OAK-BARREN. Includes the Haneses' (1947) *Q. ellipsoidalis.*

Quercus macrocarpa Michaux
Bur Oak
Common. As a relict of oak savanna. Less frequent in SUGAR-MAPLE-FOREST and OAK-HARDWOOD-FOREST. Once grew as a "grub" or small tree in BUR-OAK-SAVANNA and less frequently in other kinds of savanna. May have reached the size of an orchard tree in some savannas. Scattered large trees occur in pastures, lawns, and fencerows, and along roadsides where they have persisted (though some are planted) from former BUR-OAK-SAVANNA. Many of the large Bur Oaks scattered about Climax, Kalamazoo, Portage, and Prairie Ronde Tps. (especially in the cities of Kalamazoo and Portage) are relicts of the former BUR-OAK-SAVANNA (sometimes called bur oak plains or oak openings) that occurred in these areas. These large trees are at least 150–200 years old, and may be much older, having grown for an unknown number of years as "grubs" or small trees before fire suppression permitted them to grow into the giants we see today. Even-aged stands of Bur Oak can still be seen in a few places in the county. Here, fire suppression has permitted the former "grubs" and small trees to develop into a forest of Bur Oak. These stands are best seen along U avenue W of US 131 just N of Schoolcraft, on a hillside NE of the intersection of Drake Rd. and West Michigan Ave., in Pioneer Cemetery Park in downtown Kalamazoo, and immediately E of Dry Prairie Cemetery (Portage Tp.) (Brewer & Kitler 1989).

"There is quite an idea that this village site (Kalamazoo) was a grassy plain with scattering burr oaks; but it was a plain covered with thick and tall hazel brush [Corylus Americana], so thick that I have seen a wolf jump up so as to see what caused the row he heard; and the burr oaks were very small, little more than grubs. There stands now on West Street [Westnedge Ave.] *an oak perhaps two feet through, with a doctor's sign upon it, that when I lived on the spot, several years after I came here, was about the size of a whip stock after I had trimmed it into shape . . . "* (Turner 1911).

Quercus muhlenbergii Engelm.
Chinquapin or Yellow Chestnut Oak
Rare. Collected by the Haneses from fencerows, "Island No. 4 in the Kalamazoo River" (Cooper Tp.), Section 30 Charleston Tp., a fencerow W of Cooper's Glen, and "low woods at two separate sites in section 5 of Alamo Tp." Now known only from moist levees dominated by SUGAR-MAPLE-FOREST in a matrix of FLOODPLAIN-FOREST along the Kalamazoo River (once known as "islands" by the Haneses). Status at other previously known sites is uncertain. Occasionally planted.

Quercus palustris Muench.
Pin Oak
Common. Swampy situations including BOG, FEN, TAMARACK-SWAMP, and RED-MAPLE-SWAMP. An important component of acid, sandy HARDWOOD-SWAMP.

Quercus prinoides Willd.
Dwarf Chestnut or Dwarf Chinquapin Oak
Occasional. Collected by the Haneses from Oshtemo, Portage, and Texas Tps. growing in fencerows and "thickets" (sandy former BLACK-OAK-BARREN). Now declining in the same habitats due to increased competition from other shrubs and young trees (due to fire suppression and changes in hydrology) and habitat loss due to development. Once modal in the species rich BLACK-OAK-BARRENs that once dominated large areas of NW Kalamazoo County. At first glance large trees (occasionally exceeding 7m tall and 25 cm diameter at breast height in Oshtemo Tp.) can be confused with *Q. muhlenbergii*.

Quercus rubra L. **Hanes:** *Q. borealis*
Red Oak
Common. FLOODPLAIN-FOREST, SUGAR-MAPLE-FOREST, and OAK-HARDWOOD-FOREST. Large, presumably old trees, are a good indicator of mature terrestrial forest, and can even be found locally in old growth HARDWOOD-SWAMP (of which very little remains in Kalamazoo County).

Quercus shumardii Buckley
Shumard Oak
Current status uncertain, very rare if still extant. Known only from a Hanes collection from the "E side of Austin Lake along the roadway." Residential development has thoroughly altered the remnant savanna and forest mosaic that occurred here when the specimens cited by the Haneses (1947) were collected. R. W. Pippen reports having sought this tree unsuccessfully at the original collection site "many years ago" (R. W. Pippen pers. comm. 1997). I too have looked for this tree unsuccessfully. The specimen at WMU is not wholly typical of this species (see Voss 1985). I have decided to include it here (rather than consider it a hybrid involving some other species) since Shumard Oak has recently been verified as an element of the flora elsewhere in S Michigan (M. Penskar pers. comm. 2004).

Quercus velutina Lam.
Black Oak
Common. All kinds of oak savanna, especially BLACK-OAK-BARREN. Also common in OAK-HARDWOOD-FOREST.

ULMACEAE **Elm Family**

Celtis occidentalis L.
Hackberry
Common. Relatively wet SUGAR-MAPLE-FOREST, FLOODPLAIN-FOREST, and HARDWOOD-SWAMP. Small trees are often found in fencerows and other marginal habitats, especially near mature (usually planted) trees. Especially frequent in the SW¼ of the county.

Ulmus americana L.
American or White Elm
Common. Swamp and terrestrial forests, and wetlands. Dutch Elm Disease has killed most of the large old trees in the county and has much reduced the importance of American Elm in Kalamazoo County plant communities.

Ulmus pumila L.
Siberian Elm
Common. Expressway rights-of-way, fencerows, and other open waste places. Long cultivated, but only relatively recently naturalized. The weak wood of this fast growing tree readily breaks during ice and snow storms. Locally established and spreading. Not in Hanes & Hanes (1947).

Ulmus rubra Muhl.
Slippery or Red Elm
Occasional. Rich SUGAR-MAPLE-FOREST. The very large trees of this species reported by the Haneses (1947) from the "island" woods are gone. They may have been removed when the forest was last selectively logged and reduced in size in the 1960s, or they may have succumbed to Dutch Elm Disease.

Ulmus thomasii Sarg.
Rock or Cork Elm
Rare. HARDWOOD-SWAMP, FLOODPLAIN-FOREST, and SUGAR-MAPLE-FOREST, mostly in the E½ of the county, and especially near the Kalamazoo River.

MORACEAE **Mulberry Family**

Maclura pomifera (Raf.) Schneider
Osage-orange
Occasional. An escape from cultivation in dry old fields, fencerows, BLACK-OAK-BARREN, and degraded OAK-HARDWOOD-FOREST. Locally established.

Morus alba L.
Russian or White Mulberry
Common. Open disturbed habitats, especially fencerows and hedges. Widely established.

Morus rubra L.
Red Mulberry
Current status uncertain. Not recently collected or observed. Collected by the Haneses from swamp forest and fencerows in Charleston and Wakeshma Tps. Also reported by the Haneses (1947) based on a personal communication with H. R. Becker (and without a specimen) from Camp Custer.

CANNABACEAE Hanes: Included in MORACEAE **Hemp Family**

Cannabis sativa L.
Hemp; Marijuana
Rarely escaped. Waste places.

Humulus lupulus L. **Hanes:** *H. americanus*
Common Hops; Hop
Occasional. Fencerows and roadsides. At least partly introduced.

URTICACEAE **Nettle Family**

Boehmeria cylindrica (L.) Sw.
False Nettle
Occasional. TAMARACK-SWAMP, HARDWOOD-SWAMP, RED-MAPLE-SWAMP, FLOODPLAIN-FOREST, and SUGAR-MAPLE-FOREST.

Laportea canadensis (L.) Wedd.
Wood Nettle
Common. SUGAR-MAPLE-FOREST and HARDWOOD-SWAMP.

Parietaria pensylvanica Willd.
Pellitory
Current status unknown. RED-MAPLE-SWAMP and relatively wet SUGAR-MAPLE-FOREST.

Pilea fontana (Lunell) Rydberg
Lesser Clearweed
Occasional. A diversity of wooded wetlands.

Pilea pumila (L.) A. Gray
Clearweed
Common. HARDWOOD-SWAMP, FLOODPLAIN-FOREST, and SUGAR-MAPLE-FOREST.

Urtica dioica L.
Stinging Nettle
Common. Disturbed TAMARACK-SWAMP and WET-MEADOW. Mostly native, but introduced plants probably also occur here.

SANTALACEAE **Sandalwood Family**

Comandra umbellata (L.) Nutt. **Hanes:** *C. richardsiana*
Bastard-toadflax; Star-toadflax
Occasional. Mostly in the W½ of the county, in oak savanna and TERRESTRIAL-PRAIRIE.

ARISTOLOCHIACEAE **Birthwort Family**

Asarum canadense L.
Wild-ginger
Common. FLOODPLAIN-FOREST and ASH-SWAMP. Occasionally in other kinds of forest. Includes the Haneses (1947) *A. reflexum.*

POLYGONACEAE **Smartweed Family**

Several species are reported here based on herbarium specimens at WMU annotated by E. G. Voss and mapped in Volume II. of Michigan Flora (1985).

Fagopyrum esculentum Moench
Buckwheat
Current status unknown. Reported by the Haneses as an occasional, but not long persistent escape from cultivation in fields, along roadsides and RR rights-of-way, and near (grain) "elevators."

Polygonella articulata (L.) Meissner
Jointweed
I found the first plants of this species in 1996 growing in full sun in a very dry and sandy BLACK-OAK-BARREN reconstruction SE of the intersection of Centre St. and US 131. It is now relatively common (2002) in disturbed open situations in dry sand in the W two tiers of sections in Oshtemo and Alamo Tps. (R. Brewer pers. comm. 2003). Probably adventive. Not in Hanes & Hanes (1947). Locally established and spreading.

Polygonum achoreum Blake
Current status unknown. First recorded in 1930 from "barnyards" in and near Schoolcraft. Not native.

Polygonum amphibium L
Water Smartweed
Common. EM-MARSH, SHRUB-SWAMP, and other wetlands, including wet, disturbed situations in lawns, old fields, and ditches. This species is at least partly introduced in Kalamazoo County. The Haneses' *Polygonum coccineum* (now more commonly known as *P. amphibium* var. *emersum*), is found throughout the county.

Polygonum arifolium L.
Tear-thumb
Occasional. SHRUB-SWAMP, EM-MARSH, WET-MEADOW, and along the margins of lakes and streams.

Polygonum aviculare L.
Knotweed
Current status uncertain. Lawns and roadsides. Not native.

Polygonum convolvulus L.
Black-bindweed; False Buckwheat
Current status uncertain. Open disturbed ground and waste places. Not native.

Polygonum cuspidatum Sieb. & Zucc.
Japanese Knotweed; "Mexican Bamboo"
Current status uncertain. Fencerows, roadside ditches, and wet waste places. Not native.

Polygonum erectum L.
Erect Knotweed
Current status unknown. Collected by the Haneses from a roadside and farmyard, both in the E½ of the county.

Polygonum hydropiper L.
Water-pepper
Common. Lawns and old fields. Not native.

Polygonum hydropiperoides Michaux
Mild Water-pepper
Current status unknown. Collected by the Haneses from "wet ground" S of the shoreline of Eagle Lake and from the NW½ of Cooper Tp.

Polygonum lapathifolium L.
Willow-weed; Nodding Smartweed
Current status uncertain. WET-MEADOW, EM-MARSH, and FEN. Partly introduced.

Polygonum orientale L.
Prince's Feather; Kiss-me-over-the-garden-gate
Locally established. Waste places throughout.

Polygonum pensylvanicum L.
Pinkweed; Bigseed Smartweed
Common. EM-MARSH and wet depressions in FEN and WET-MEADOW, often near streams.

Polygonum persicaria L.
Heart's-ease; Lady's-thumb
Current status uncertain. Cultivated ground and roadsides. Not native.

Polygonum punctatum Ell.
Dotted Smartweed
Current status uncertain. SHRUB-SWAMP, WET-MEADOW, and FEN, mostly in the S½ of the county.

Polygonum sagittatum L.
Tear-thumb
Common. SHRUB-SWAMP, WET-MEADOW, and EM-MARSH.

Polygonum scandens L.
False Buckwheat; Black-bindweed
Current status uncertain. Swamp forests, especially at edges.

Polygonum tenue Michaux
Slender Knotweed
Current status unknown. Collected by the Haneses from BLACK-OAK-BARREN mostly in the west half of the county.

Polygonum virginianum L. **Hanes:** *Tovara virginiana*
Jumpseed
Occasional. HARDWOOD-SWAMP, FLOODPLAIN-FOREST, and SUGAR-MAPLE-FOREST.

Rumex acetosella L.
Sheep or Red Sorrel
Common. A diversity of dry and open, disturbed situations. Widely established.

Rumex altissimus Wood
Pale Dock
Current status unknown. Collected by the Haneses from a roadside "½ mi. W of Schoolcraft," and from a roadside on the S side of section 16 of Brady Tp. "in somewhat moist soil." No other collections are known.

Rumex crispus L.
Curly or Sour Dock
Common. A diversity of wet open habitats including roadside ditches, EM-MARSH, and boggy WET-MEADOW. Not native.

Rumex obtusifolius L.
Bitter Dock
Current status uncertain. Ditches, EM-MARSH, WET-MEADOW, and lawns. Not native.

Rumex orbiculatus A. Gray
Great Water Dock
Occasional. EM-MARSH including ponds, ditches, and lakeshores.

Rumex triangulivalvis (Danser) Rech. f.
Current status unknown. Collected by the Haneses on 23 June 1953 from along a RR right-of-way ¾ mi. W of the "Knappen elevator" near Schoolcraft. Not in Hanes & Hanes (1947).

Rumex verticillatus L.
Water Dock
Current status uncertain. FLOODPLAIN-FOREST.

CHENOPODIACEAE **Goosefoot Family**

A young specimen lacking fruit and with the leaves three-nerved at the base was collected 14 July 1926 by L. A. Kenoyer near the "New Borgess Hospital in dry soil" (WMU). Voss (1985) says this specimen may represent *Chenopodium dessicatum* A. Nelson, Narrow-Leaved Goosefoot (the Hane-

ses' (1947) *C. pratericola*). Since this specimen is difficult to place, I have chosen not to treat it separately below.

Atriplex patula L.
Spearscale
Occasional. Open disturbed situations. Not native.

Chenopodium album L.
Lamb's-quarters; "Pigweed"
Common. Gardens, cultivated fields, and recently cleared ground. Widely established. Includes the Haneses' (1947) *C. berlandieri.*

Chenopodium ambrosioides L.
Wormseed; Mexican-tea
Collected by the first botanical survey in 1838 (Voss 1985). Not since collected or observed. Not native.

Chenopodium botrys L.
Jerusalem-oak
Current status unknown. Collected by the Haneses from the S½ of the county. Also collected by the first botanical survey. Not native.

Chenopodium hybridum L. **Hanes:** *C. gigantospermum*
Maple-leaved Goosefoot
Current status unknown. Gardens and other open disturbed ground.

Chenopodium murale L.
Nettle-leaved Goosefoot
Current status unknown. First collected in 1935 from the Haneses' garden in Schoolcraft. Not native.

Cycloloma atriplicifolium (Sprengel) Coulter
Winged Pigweed
Current status uncertain. Dry, sandy, disturbed situations, especially along RR rights-of-way. Not native.

Kochia scoparia (L.) Schrader
Summer-cypress
Current status unknown. Collected by the Haneses near a dump in Schoolcraft. Not native.

Salsola kali L. **Hanes:** *S. pestifer*
Russian-thistle
Occasional. RR rights-of-way, dry sandy roadsides, and dry disturbed ground. Widely established.

AMARANTHACEAE **Amaranth Family**

Amaranthus albus L.
Tumbleweed
Occasional. Dry sandy soil, especially roadsides and RR rights-of-way. Widely established.

Amaranthus blitoides S. Watson **Hanes:** *A. graecizans*
Prostrate Amaranth
Occasional. Cultivated fields, roadsides, and gardens. Not native.

Amaranthus cruentus L.
Purple Amaranth
Current status unknown. Collected by the Haneses from near the Schoolcraft Town Dump, and from along a roadside 1 mi. S of Crooked Lake. Not native.

Amaranthus hybridus L.
Green Amaranth
Common. Cultivated fields, gardens, and pastures. Widely established.

Amaranthus hypochondriacus L.
Locally established. Not in Hanes & Hanes (1947). Not native.

Amaranthus powellii S. Watson
Current status unknown. Collected by the Haneses from disturbed ground. Not in Hanes & Hanes (1947). Not native.

Amaranthus retroflexus L.
Green Amaranth
Occasional. A weed of agricultural crops and pastures throughout the county. Probably native. The first Michigan collection was made by the first survey in 1838 at Grand Prairie.

Amaranthus tuberculatus (Moq.) Sauer **Hanes:** *Acnida altissima*
Tall Water Hemp
Current status uncertain. EM-MARSH.

NYCTAGINACEAE **Four-o'clock Family**

Mirabilis hirsuta (Pursh) MacM. **Hanes:** *Oxybaphus hirsutus*
Hairy Umbrellawort
Current status unknown. Collected by the Haneses from along RR rights-of-way E and W of Schoolcraft. Not native.

Mirabilis nyctaginea (Michaux) MacM. **Hanes:** *Oxybaphus nyctagineus*
Wild Four-o'clock
Occasional. RR rights-of-way and roadsides. Widely established.

PHYTOLACCACEAE **Pokeweed Family**

Phytolacca americana L.
Pokeweed; Poke
Common. SUGAR-MAPLE-FOREST and OAK-HARDWOOD-FOREST, often in tree-fall gaps. Also in fencerows and other disturbed situations.

MOLLUGINACEAE Hanes: AIZOACEAE **Carpetweed Family**

Mollugo verticillata L.
Carpetweed
Common. Disturbed ground. Probably native.

PORTULACACEAE **Purslane Family**

Claytonia virginica L.
Spring Beauty
Common. SUGAR-MAPLE-FOREST and OAK-HARDWOOD-FOREST. The Haneses report this species from "prairie roadsides" on Prairie Ronde.

Portulaca grandiflora Hooker
Rose-moss
Locally established. Lawns.

Portulaca oleracea L.
Purslane; Pusley
Common. Gardens, sidewalk cracks, and parking lots. Widely established.

CARYOPHYLLACEAE **Pink Family**

Agrostemma githago L.
Corn-cockle
Not recently collected or observed. A former weed in rye and other grain fields. Not native.

Arenaria serpyllifolia L.
Thyme-leaved Sandwort
Common. RR rights-of-way, sandy roadsides, and BLACK-OAK-BARREN, mostly in the W½ of the county. Not native.

Arenaria stricta Michaux
Rock Sandwort
Current status uncertain, very rare if still extant. Collected by the Haneses from sandy BLACK-OAK-BARREN and hillside prairie, and by the first botanical survey from Grand Prairie. Richard Brewer (1984) reports this species from the former right-of-way of the MI Central RR on the N edge of Genesee Prairie. This site has been partly destroyed by development.

Cerastium arvense L.
Field Chickweed
Current status unknown. Probably native in BLACK-OAK-BARREN and other dry, usually sandy, open areas including lawns and roadsides. Not in Hanes & Hanes (1947).

Cerastium fontanum Baumg. **Hanes:** *C. vulgatum*
Mouse-ear Chickweed
Common in a diversity of disturbed open situations. Not native.

Cerastium nutans Raf.
Nodding Chickweed
Current status unknown. Collected by the Haneses from "the border of woods and in an old field in section 4 of Prairie Ronde Tp."

Cerastium semidecandrum L.
Current status uncertain. Sandy open ground along roadsides and in lawns and parks. Not native. Not in Hanes & Hanes (1947).

Cerastium tomentosum L.
Snow-in-summer
Locally established. Lawns and roadsides. Not native. Not in Hanes & Hanes (1947).

Dianthus armeria L.
Deptford Pink
Occasional. Dry roadsides, RR rights-of-way, and old fields.

Dianthus barbatus L.
Sweet William
Locally established. Cemeteries.

Dianthus deltoides L.
Maiden Pink
Locally established. Cemeteries.

Lychnis coronaria (L.) Desr.
Mullein Pink
Occasional. Roadsides, lightly wooded hillsides, and other dry, lightly shaded situations.

Myosoton aquaticum (L.) Moench **Hanes:** *Stellaria aquatica*
Giant Chickweed

Current status unknown. Collected by the Haneses only from "the border of a swamp" S of Mud Lake in Brady Tp. Not native.

Paronychia canadensis (L.) Wood
Forked Chickweed
Current status uncertain. Sandy OAK-HICKORY-FOREST and oak savanna. Also known from relatively wet prairie-like situations.

Saponaria officinalis L.
Bouncing Bet; Soapwort
Common. Roadsides, RR rights-of-way, and other moist, more or less disturbed situations. Double-flowered plants are frequently encountered. Widely established.

Scleranthus annuus L.
Current status unknown. First collected in 1934 by the Haneses from a cultivated field in Section 16 Prairie Ronde Tp. Not native.

Silene antirrhina L.
Sleepy Catchfly
Occasional. Open roadsides, RR rights-of-way, fencerows, and BLACK-OAK-BARREN.

Silene armeria L.
Sweet-William Catchfly
Occasional. Roadsides, RR rights-of-way, old fields, and other dry, disturbed situations. Widely established.

Silene dichotoma Ehrh.
Common. BLACK-OAK-BARREN, OAK-HARDWOOD-FOREST, and other sandy disturbed situations.

Silene noctiflora L.
Night-flowering Catchfly
Occasional. Old fields, roadsides, and RR rights-of-way.

Silene pratensis (Rafn) Goron & Gren. **Hanes:** *Lychnis alba*
White Cockle; White Campion
Common. Disturbed, open situations. Not native.

Silene stellata (L.) Aiton f.
Starry Campion
Very rare. According to the Haneses (1947) this species was "rare" on "wooded banks" (probably overgrown WHITE-OAK-SAVANNA, and in my opinion, not typical hillside prairie), mostly near the Kalamazoo River (Hanes & Hanes 1947). Collected in 1975 by R. W. Pippen from an opening in an even-aged Black Oak and White Oak forest (former WHITE-OAK-SAVANNA) W of the "Goldsworth Valley" Dormitories at WMU. The only known extant occurrence is a small patch of seven plants (August 2002) on the N side of Asylum Lake on a steep slope beneath large Black and White Oaks in loamy sand, and associated with *Antennaria parlinii, Aster macrophyllus, Poa compressa, Carex pensylvanica, Prunus serotina,* and *Pteridium aquilinum*. Few other prairie plants persist in the heavy shade at this site. This area is within the former right-of-way of the MI Central RR, and is a nice overgrown hillside in apparently uncultivated former WHITE-OAK-SAVANNA. This is also a former site for *Silphium integrifolium*. *Silene stellata* may once have been frequent in hilly WHITE-OAK-SAVANNA throughout Kalamazoo County.

Silene vulgaris (Moench) Garcke **Hanes:** *S. cucubalus*
Bladder Campion
Occasional. Roadsides, RR rights-of-way, and in other dry, disturbed situations. Not native.

Stellaria crassifolia Ehrh.
Rare. Most collections are from the interface between FEN and open water, especially along the edges of streams.

Stellaria graminea L.
Lesser Stitchwort
Current status uncertain. RR rights-of-way in and around Schoolcraft and Vicksburg. Not native.

Stellaria longifolia Willd.
Long-leaved Stitchwort
Current status uncertain. TAMARACK-SWAMP, RED-MAPLE-SWAMP, and wooded FEN and BOG.

Stellaria media (L.) Vill.
Common Chickweed
Common in a diversity of relatively open situations.

Vaccaria hispanica (Miller) Rauschert
Cow Herb
Current status unknown. Collected by H. R. Becker from a lawn in Charleston Tp. on 20 July 1951. Not native. Not in Hanes & Hanes (1947).

CERATOPHYLLACEAE **Hornwort Family**

Ceratophyllum demersum L.
Hornwort
Occasional. SUB-MARSH and EM-MARSH.

NYMPHAEACEAE **Water-lily Family**

Brasenia schreberi J. F. Gmelin
Water-shield
Common. Usually in SUB-MARSH and EM-MARSH of sandy-bottomed lakes.

Cabomba caroliniana A. Gray
Fanwort
First collected by F. W. Rapp in 1935, but cited as 1936 in the Haneses' flora (Hanes 1938; Hanes & Hanes 1947). Collected by the Haneses from Kimble, Barton, Howard, and other lakes connected to Portage Creek. Still extant (fall 2002), and covering large areas of the aforementioned lakes and waterways to the exclusion of most native aquatic vegetation. Appears to contribute substantially to the accumulation of organic material on the lake bottom. Probably not native.

Nelumbo lutea (Willd.) Pers. **Hanes:** *N. pentapetala*
American Lotus; "Lotus-lily"
Extinct. Occurred in EM-MARSH at Sunset Lake in Vicksburg (a former Mill Pond), probably since the middle of the 19th century (Voss 1972). To my knowledge, first collected by W. J. Beal in 1878 and last collected by the Haneses on 11 July 1934. A short, typed report on the flora of the county written by C. R. Hanes (date of preparation unknown, but certainly post 1934), reads "The Lotus, which formerly grew at Vicksburg . . . ". This suggests that it was by then extinct. Not collected or reported since the 1934 Hanes collection. Probably not native.

Nuphar advena (Aiton) Aiton f.
Yellow Spatterdock
Common. SUB-MARSH and EM-MARSH of lakes, ponds, and streams.

Nuphar variegata Durand **Hanes:** *N. variegatum*
Variegated Spatterdock
Occasional. SUB-MARSH and EM-MARSH of ponds and lakes, usually in open water.

Nymphaea odorata Aiton
Sweet Water Lily
Common. SUB-MARSH and EM-MARSH. Here includes *N. tuberosa*, (see Voss 1972). Includes the Haneses' (1947) *N. tuberosa.*

RANUNCULACEAE **Buttercup Family**

Actaea pachypoda Ell.
White Baneberry; Doll's-eyes
Occasional. SUGAR-MAPLE-FOREST.

Actaea rubra (Aiton) Willd.
Red Baneberry
Rare. HARDWOOD-SWAMP and relatively wet SUGAR-MAPLE-FOREST.

Anemone canadensis L.
Canada Anemone
Rare. Collected by the Haneses from WET-PRAIRIE, WET-MEADOW, and from roadsides and RR rights-of-way. No longer known from WET-PRAIRIE.

Anemone cylindrica A. Gray
Thimbleweed
Occasional. RR rights-of-way and sandy BLACK-OAK-BARREN.

Anemone quinquefolia L.
Wood Anemone
Occasional. WET-MEADOW, RED-MAPLE-SWAMP, TAMARACK-SWAMP, and FEN.

Anemone virginiana L.
Thimbleweed
Occasional. OAK-HARDWOOD-FOREST, especially forest edges. Probably once also occurred in oak savanna.

Anemonella thalictroides (L.) Spach
Rue-anemone
Common. SUGAR-MAPLE-FOREST.

Aquilegia canadensis L.
Wild Columbine
Occasional. FEN and WET-PRAIRIE.

Caltha palustris L.
Marsh Marigold; Cowslip
Common. FEN, WET-MEADOW, and HARDWOOD-SWAMP.

Clematis virginiana L.
Virgin's-bower
Occasional. BUR-OAK-SAVANNA, WET-MEADOW, FEN, WET-PRAIRIE, and RR rights-of-way.

Consolida ambigua (L.) Ball & Heywood **Hanes:** *Delphinium ajacis*
Larkspur
Collected by the Haneses from a roadside near woods S of Austin Lake on 16 July 1935. Not since collected. Not native.

Coptis trifolia (L.) Salisb. **Hanes:** *C. groenlandica*
Goldthread
Common. RED-MAPLE-SWAMP and TAMARACK-SWAMP.

Hepatica acutiloba DC.
Sharp-lobed Hepatica
Occasional. SUGAR-MAPLE-FOREST and OAK-HARDWOOD-FOREST.

Hepatica americana (DC.) Ker
Round-Leaved Hepatica
Occasional. Well-drained SUGAR-MAPLE-FOREST and OAK-HARDWOOD-FOREST. Reported by R. Brewer (1984) from TERRESTRIAL-PRAIRIE along the former right-of-way of the MI Central RR on the edge of Genesee Prairie.

Hydrastis canadensis L.
Goldenseal
Rare. Rich HARDWOOD-SWAMP and SUGAR-MAPLE-FOREST. Sometimes associated with other relative rarities such as *Panax quinquefolius*. Planted in HARDWOOD-SWAMP SW of Fulton in the 1950s (K. Chapman, MNFI Site survey 1980).

Isopyrum biternatum (Raf.) T. & G.
False Rue-anemone
Occasional. FLOODPLAIN-FOREST, SUGAR-MAPLE-FOREST, and OAK-HARDWOOD-FOREST. Less frequent than *Anemonella thalictroides* with which it is often confused.

Ranunculus abortivus L.
Small-flowered Buttercup
Common. RED-MAPLE-SWAMP, FLOODPLAIN-FOREST, SUGAR-MAPLE-FOREST, OAK-HARDWOOD-FOREST, roadsides, and old fields.

Ranunculus acris L.
Tall or Common Buttercup
Occasional. RR rights-of-way, roadsides, and other disturbed situations. Not native.

Ranunculus fascicularis Bigelow
Early Buttercup
Rare. TERRESTRIAL-PRAIRIE and open OAK-HARDWOOD-FOREST. Easily overlooked because it flowers in late March and April (as in the Pioneer cemetery on 12th street near Schoolcraft). Once also a component of dry-mesic to mesic oak savannas.

Ranunculus flabellaris Raf.
Yellow Water Crowfoot
Current status unknown. Collected by the Haneses from EM-MARSH. Most specimens were collected in water at pond edges or in SHRUB-SWAMP.

Ranunculus hispidus Michaux
Swamp Buttercup
Both var. *hispidus* and var. *caricetorum* occur in Kalamazoo County (Voss 1985). The var. *caricetorum* is occasional in FEN and shrubby WET-MEADOW, usually near open water. Typical var. *hispidus* is relatively rare? throughout in dry, usually sandy situations in OAK-HARDWOOD-FOREST. Includes the Haneses' (1947) *R. septentrionalis*.

Ranunculus longirostris Godron
White Water Crowfoot
Current status uncertain. EM-MARSH of creeks, lakes, drainage ditches, and ponds. Includes the Haneses (1947) *R. trichophyllus*.

Ranunculus pensylvanicus L. f.
Bristly Crowfoot
Occasional. WET-MEADOW and EM-MARSH.

Ranunculus recurvatus Poiret
Hooked Crowfoot
Occasional. HARDWOOD-SWAMP.

Ranunculus repens L.
Creeping Buttercup
Current status uncertain. RR rights-of-way and roadsides, especially near wetlands.

Ranunculus sceleratus L.
Cursed Crowfoot
Occasional. EM-MARSH, WET-MEADOW, and FEN. Probably at least in part introduced.

Thalictrum dasycarpum Fisch. & Avé-Lall.
Purple Meadow-rue
Occasional. WET-MEADOW, WET-PRAIRIE, and FEN.

Thalictrum dioicum L.
Early Meadow-rue
Occasional. Open OAK-HARDWOOD-FOREST, often on hillsides.

BERBERIDACEAE **Barberry Family**

Berberis thunbergii DC.
Japanese Barberry
Rarely escaped. Disturbed SUGAR-MAPLE-FOREST and OAK-HARDWOOD-FOREST.

Berberis vulgaris L.
Common Barberry
Last collected by the Haneses from section 23 of Portage Tp. in 1945. Only two bushes were ever known outside of cultivation. No recent collections or reports are known.

Caulophyllum thalictroides (L.) Michaux
Blue Cohosh
Occasional. Rich SUGAR-MAPLE-FOREST.

Mahonia aquifolium (Pursh) Nutt. **Hanes:** *Berberis aquifolium*
Oregon-grape
Locally established. OAK-HARDWOOD-FOREST in the S½ of the county.

Podophyllum peltatum L.
May-apple; Mandrake
Common. SUGAR-MAPLE-FOREST and OAK-HARDWOOD-FOREST.

MENISPERMACEAE **Moonseed Family**

Menispermum canadense L.
Moonseed
Reportedly found in FLOODPLAIN-FOREST along the Kalamazoo River at the Augusta Floodplain Forest Preserve (Meagher & Tonsor 1992). Not native. Not in Hanes & Hanes (1947).

MAGNOLIACEAE **Magnolia Family**

Liriodendron tulipfera L.
Tulip-tree; Tulip-poplar; Yellow-poplar
Occasional. SUGAR-MAPLE-FOREST. A massive old tree more than 1 m in diameter at chest height grows in old SUGAR-MAPLE-FOREST near Paw Paw Lake.

ANNONACEAE **Custard-apple Family**

Asimina triloba (L.) Dunal
Pawpaw
Occasional. Mostly in the S½ of the county in wet depressions in rich, relatively wet SUGAR-MAPLE-FOREST, ASH-SWAMP, and HARDWOOD-SWAMP.

LAURACEAE **Laurel Family**

Lindera benzoin (L.) Blume
Spicebush
Common. ASH-SWAMP, TAMARACK-SWAMP, HARDWOOD-SWAMP, RED-MAPLE-SWAMP, and FLOODPLAIN-FOREST.

Sassafras albidum (Nutt.) Nees
Sassafras
Common. Open to lightly wooded situations. Often particularly abundant in overgrown WHITE-OAK-SAVANNA and at OAK-HARDWOOD-FOREST edges.

PAPAVERACEAE **Poppy Family**

Chelidonium majus L.
Celandine
Occasional. SUGAR-MAPLE-FOREST and FLOODPLAIN-FOREST. Not native.

Macleaya cordata (Willd.) R. Br.
Plume Poppy
Current status unknown. Reported by Voss (1985). Not in Hanes & Hanes (1947). Not native.

Papaver orientale L.
Oriental Poppy
Current status unknown. Collected by W. T. Gillis from the NE¼ S5 Ross Tp. (14692 MSC) on 12 June 1978, "relict from cultivation, spreading onto roadsides." Not in Hanes & Hanes (1947). Not native.

Papaver rhoeas L.
Corn, Field, or Flanders Poppy
Current status unknown. Collected by the Haneses from the "Crissel yard" in the village of Schoolcraft on 10 August 1937. Specimen label also reads "roadsides & gardens." Not in Hanes & Hanes (1947). Not native.

Sanguinaria canadensis L.
Bloodroot
Common. SUGAR-MAPLE-FOREST and OAK-HARDWOOD-FOREST. Interestingly, the Haneses report finding only a few plants along the roadside W of Schoolcraft alongside the "Island" woods where they note that it was once abundant. Today, *S. canadensis* is again abundant throughout the remaining few acres of the "Island" woods.

Stylophorum diphyllum (Michaux) Nutt.
Celandine or Wood Poppy
Occasional. Rich SUGAR-MAPLE-FOREST.

FUMARIACEAE **Fumitory Family**

Adlumia fungosa (Aiton) BSP.
Climbing Fumitory; Alleghany Vine
Extinct. Collected by A. C. Roberts "SW of Kalamazoo, near Winslow's" (KVM). There is no date or habitat given on this specimen. Not in Hanes & Hanes (1947). Possibly adventive.

Corydalis flavula (Raf.) DC.
Yellow Harlequin
Rare. Comstock Tp. near the Kalamazoo River in moist to wet soil, including along trails in disturbed forest (Higman 1997). Possibly introduced.

Dicentra canadensis (Goldie) Walp.
Squirrel-corn
Occasional. SUGAR-MAPLE-FOREST.

Dicentra cucullaria (L.) Bernh.
Dutchman's-breeches
Common. SUGAR-MAPLE-FOREST.

CAPPARACEAE Hanes: CAPPARACEAE **Caper Family**

Cleome serrulata Pursh, (Rocky Mountain Bee Plant) is reported from the Augusta Floodplain Forest Preserve growing in a "weed-patch" on a moist rise of soil (Meagher & Tonsor 1992). I have not been able to locate a specimen at KBSMS, MICH, MSC, or WMU, and have not formally included it below in the annotated checklist. Not native. Not in Hanes & Hanes (1947).

Polanisia dodecandra (L.) DC. **Hanes:** *Polanesia graveolens*
Clammy-weed
Current status unknown. Known only from ballast along a RR right-of-way near the N boundary of Section 5 Schoolcraft Tp.

CRUCIFERAE (BRASSICACEAE) Mustard Family

Alliaria petiolata (Bieb.) Cavara & Grande
Garlic Mustard
Common. Swamp and terrestrial forests, and lightly shaded disturbed situations throughout. An aggressive threat to the diversity of our native woodland flora. Widely established.

Alyssum alyssoides (L.) L.
Pale Alyssum
Occasional. RR rights-of-way and roadsides. Locally established.

Arabidopsis thaliana (L.) Heynh.
Mouse-ear Cress
Occasional. RR rights-of-way, roadsides, lawns, old fields, and disturbed ground. Not native.

Arabis canadensis L.
Sickle-pod
Current status uncertain. OAK-HARDWOOD-FOREST and BLACK-OAK-BARREN, usually on steep slopes including hillside prairie.

Arabis glabra (L.) Bernh.
Tower Mustard
Occasional. Moist sandy lakeshores and similar sunny, moist situations, primarily in the W½ of the county.

Arabis hirsuta (L.) Scop.
Hairy Rock Cress
Current status uncertain. OAK-HARDWOOD-FOREST, BLACK-OAK-BARREN, and other dry, lightly wooded situations. One Hanes collection is from "somewhat moist soil along the Kalamazoo River E of Galesburg" (Hanes 1943).

Arabis laevigata (Willd.) Poiret
Smooth Rock Cress

Current status uncertain. On banks and moist rises (sometimes called islands or levees) in SUGAR-MAPLE-FOREST in a matrix of otherwise typical FLOODPLAIN-FOREST near the Kalamazoo River.

Arabis lyrata L.
Sand Cress
Common. BLACK-OAK-BARREN mostly in the W½ of the county.

Arabis missouriensis Greene
Very rare. BLACK-OAK-BARREN and sandy OAK-HARDWOOD-FOREST in the W½ of the county. Most former sites for this species are no longer extant. All our specimens are of the var. *deamii*.

Armoracia rusticana Gaertn., Mey., & Scherb.
Horseradish
Rarely escaped. Roadsides, ditches, and EM-MARSH.

Barbarea verna (Miller) Asch.
Early Winter Cress
Current status unknown. Collected by the Haneses in 1935 and 1940 from several sites, all in the W½ of the county. Not since known. Not native.

Barbarea vulgaris R. Br.
Yellow Rocket
Common. Open situations with moist soil. Widely established.

Berteroa incana (L.) DC.
Hoary Alyssum
Occasional. RR rights-of-way, roadsides, and old fields. Widely established.

Brassica kaber (DC.) Wheeler
Charlock; Wild Mustard
Occasional. Open disturbed ground of all kinds. Not native.

Brassica napus L.
Rape; Rutabaga
Current status unknown. Known only from collections made by the Haneses on a farm in 1938, and from along a RR right-of-way in 1953. Not native. Not reported by the Haneses (1947).

Brassica nigra (L.) Koch
Black Mustard
Current status unknown. Gardens, old fields, and other disturbed situations. Not native.

Camelina microcarpa DC.
Small-fruited False Flax
Current status uncertain. Roadsides and old fields. Not native.

Capsella bursa-pastoris (L.) Medicus
Shepherd's-purse
Common. Roadsides and other waste places. Widely established.

Cardamine bulbosa (Muhl.) BSP.
Spring Cress
Current status uncertain. FEN, WET-MEADOW, and HARDWOOD-SWAMP.

Cardamine douglassii Britton
Pink Spring Cress
Common. SUGAR-MAPLE-FOREST.

Cardamine pensylvanica Willd.
Pennsylvania Bittercress
Occasional. Locally abundant in TAMARACK-SWAMP and WET-MEADOW along Flowerfield Creek. The Haneses report plants from several additional sites that I have not revisited, including "near Shellman Lake" (Alamo Tp.), section 26 of Brady Tp., and section 26 of Wakeshma Tp.

Cardamine pratensis L.
Cuckoo-flower
Occasional. WET-MEADOW, FEN, RED-MAPLE-SWAMP, and TAMARACK-SWAMP, mostly in the S½ of the county.

Conringia orientalis (L.) Dumort.
Hare's-ear Mustard
Current status unknown. RR right-of-ways and roadsides. Not native.

Dentaria diphylla Michaux
Two-leaved Toothwort
Occasional. SUGAR-MAPLE-FOREST.

Dentaria laciniata Willd.
Cut-leaved Toothwort
Occasional. SUGAR-MAPLE-FOREST.

Descurainia pinnata (Walter) Britton
Tansy Mustard
Current status unknown. Collected by the Haneses from along a RR right-of-way 6 mi. SW of Schoolcraft. Not native.

Descurainia sophia (L.) Prantl
Current status unknown. Known only from a collection made by the Haneses from a RR right-of-way 1 mi. W of Vicksburg in 1953. Not native. Not in Hanes & Hanes (1947).

Draba reptans (Lam.) Fern.
Carolina Whitlow Grass
Extinct. Known only from a Hanes collection made from sandy soil along a RR right-of-way S of Portage (a region of former oak savanna). Collected in flower at this site on 30 April 1937 and with seeds on 6 May 1937. I have not been able to relocate plants in this area despite at least half a dozen searches. Reported by Brewer (1984) without a specimen, from the former right-of-way of the Michigan Central RR on the N edge of Genesee Prairie. This site has since been almost entirely overgrown with shrubs and trees. I have not found any plants here despite several searches.

Erophila verna (L.) Besser **Hanes:** *Draba verna*
Whitlow-grass
A common weed in lawns throughout. Widely established.

Erucastrum gallicum (Willd.) Schultz
Dog Mustard
Current status unknown. Collected by the Haneses from RR rights-of-way (Hanes 1939). Not native.

Erysimum cheiranthoides L.
Wormseed Mustard
Current status unknown. Moist soil along RR rights-of-way and roadsides. Both native and introduced plants probably occur in Kalamazoo County (Voss 1996).

Erysimum hieraciifolium L. **Hanes:** *E. parviflorum*
Current status unknown. Known only from collections made in 1937 and 1939 by the Haneses. Not native.

Erysimum repandum L.
Treacle Mustard
Current status unknown. Collected by the Haneses (1933–1953) from along RR rights-of-way near Schoolcraft. Not native. Not in Hanes & Hanes (1947).

Hesperis matronalis L.
Dame's Rocket
Common. At woodland edges and in moist to wet lightly shaded situations along roadsides. Increasing in recent years (R. Brewer pers. comm. 2001). Not native.

Lepidium campestre (L.) R. Br.
Field Peppergrass
Occasional. Fields, roadsides, and RR rights-of-way. Not native.

Lepidium densiflorum Schrader **Hanes:** *L. apetalum*
Current status unknown. Collected by the Haneses from old fields and a RR right-of-way. Not native.

Lepidium perfoliatum L.
Perfoliate Peppergrass
Current status unknown. Collected by the Haneses from old fields and RR rights-of-way. Not native. First collected in 1935 (Hermann 1936).

Lepidium virginicum L.
Peppergrass
Current status uncertain. Old fields, roadsides, and RR rights-of-way.

Lunaria annua L.
Money-plant; Honesty
Occasional. First collected by E. M. Block on 18 May 1971. Widely cultivated. Has increased along roadsides and in waste places in the last few years. Not native. Not in Hanes & Hanes (1947).

Nasturtium officinale R. Br.
Watercress
Common. Streams and ditches. Widely established.

Raphanus raphanistrum L.
Wild Radish
Current status unknown. Collected by the Haneses from old fields in Section 29 Brady Tp. Not native.

Raphanus sativus L.
Radish
Current status unknown. Not native. Not in Hanes & Hanes (1947).

Rorippa palustris (L.) Besser **Hanes:** *R. islandica*
Marsh Cress
Current status uncertain. EM-MARSH.

Rorippa sylvestris (L.) Besser
Creeping Yellow Cress
Current status unknown. Collected by the Haneses from lawns and lakeshores. Not native.

Sisymbrium altissimum L.
Tumble Mustard
Current status unknown. Disturbed sandy situations. Not native.

Sisymbrium officinale (L.) Scop.
Hedge Mustard
Occasional. Roadsides and other open, disturbed situations. Rarely escaped.

Thlaspi arvense L.
Penny Cress
Occasional. RR rights-of-way and roadsides.

SARRACENIACEAE **Pitcher-plant Family**

Sarracenia purpurea L.
Pitcher-plant
Common. BOG and FEN sedge meadow.

DROSERACEAE **Sundew Family**

Drosera intermedia Hayne
Spatulate-leaved Sundew
Occasional. BOG. Thousands of plants carpet the black, acidic muck in trails and wet depressions at Bishop's BOG. Also relatively abundant at LeFevre BOG in Section 8 Climax Tp. Otherwise rare in open wet depressions in FEN sedge meadow. Collected by the Haneses from the E side of Austin Lake growing in peaty sand (this area was once dominated by an exceptionally species rich mosaic of COASTAL-PLAIN-MARSH, open OAK-HARDWOOD-FOREST, and damp, sandy/peaty WET-PRAIRIE and oak savanna).

Drosera rotundifolia L.
Round-Leaved Sundew
Common. Usually on the sides of hummocks of *Sphagnum* or sedge in FEN and BOG.

CRASSULACEAE **Orpine Family**

Sedum acre L.
Mossy Stonecrop
Locally established. Cemeteries and dry sandy disturbed situations.

Sedum telephium L. **Hanes:** *S. triphyllum*
Live-forever
Rarely escaped. Often persists on old homesites. Occasionally spreading to nearby thickets and forest edges.

Sedum ternatum Michaux
Current status unknown. Collected by the Haneses from a small sandy peninsula at Crooked Lake (Texas Tp.). Not native.

PENTHORACEAE **Ditch Stonecrop Family**

Penthorum sedoides L.
Ditch Stonecrop
Occasional. SHRUB-SWAMP, depressions in FEN, BOG moats, and ditches.

SAXIFRAGACEAE **Saxifrage Family**

Chrysosplenium americanum Hooker
Golden Saxifrage
Current status uncertain. Cool streams.

Heuchera richardsonii R. Br.
Alumroot
Rare. FEN, WET-PRAIRIE, HARDWOOD-SWAMP, RED-MAPLE-SWAMP, and open, hilly OAK-HARDWOOD-FOREST. Some of our specimens approach *H. americana* L. (Voss 1985).

Mitella diphylla L.
Bishop's-cap
Occasional. HARDWOOD-SWAMP, RED-MAPLE-SWAMP, and SUGAR-MAPLE-FOREST.

Mitella nuda L.
Naked Miterwort
Current status uncertain. Not recently collected or observed. Known only from Hanes collections in RED-MAPLE-SWAMP near Sugarloaf Lake, and from a forest in section 19 of Richland Tp.

Parnassia glauca Raf.
Grass-of-Parnassus
Occasional. WET-MEADOW, FEN, seepage BOG (in alkaline microclimates), and along the otherwise marly shores of lakes and streams.

Saxifraga pensylvanica L.
Swamp Saxifrage
Occasional. FEN and RED-MAPLE-SWAMP bordering lakes. Collected by the Haneses and by R. Brewer (1965) from WET-PRAIRIE, but no longer known from this nearly extinct plant community.

GROSSULARIACEAE **Gooseberry Family**

Ribes americanum Miller
Wild Black Currant
Occasional. SUGAR-MAPLE-FOREST.

Ribes cynobasti L. **Hanes:** *Grossularia cynosbasti*
Wild or Prickly Gooseberry
Current status uncertain. SUGAR-MAPLE-FOREST.

Ribes hirtellum Michaux **Hanes:** *Grossularia hirtella*
Swamp Gooseberry
Current status uncertain. Wet depressions in SUGAR-MAPLE-FOREST and HARDWOOD-SWAMP.

Ribes odoratum Wendl. f.
Buffalo or Golden Currant
Rare. Roadsides and old homesites. Not native.

HAMAMELIDACEAE **Witch-hazel Family**

Hamamelis virginiana L.
Witch-hazel
Occasional. OAK-HARDWOOD-FOREST.

PLATANACEAE **Plane-tree Family**

Platanus occidentalis L.
Sycamore
Occasional. FLOODPLAIN-FOREST and HARDWOOD-SWAMP.

ROSACEAE **Rose Family**

This is a large and diverse family in Kalamazoo County. Several species in the difficult genera *Amelanchier, Crataegus,* and *Rubus* are reported here based only upon annotations made to herbarium specimens at WMU by E. G. Voss and mapped in Volume II. of Michigan Flora (1985).

The genus *Crataegus* is quite problematic in Kalamazoo County (and beyond). I have relied heavily on Voss (1985) in treating this genus. Several species reported in Hanes & Hanes (1947) are excluded from this treatment due to inadequate material or other similar problems (see Table 6).

The genus *Rubus* also presents a formidable challenge. To add to the confusion, several species have been described from Kalamazoo County (Hanes & Hanes 1947). Today, it seems best to treat this

genus in a rather conservative manner, such as was done by E. G. Voss (1985). The way I have treated the genus *Rubus* (relying heavily on the published distribution maps and synonyms provided by Voss 1985) seems practical for an annotated checklist such as this. When possible, I have indicated Hanes & Hanes (1947) synonyms.

Agrimonia gryposepala Wallr.
Tall Agrimony
Common. FEN, WET-PRAIRIE, and OAK-HARDWOOD-FOREST.

Agrimonia parviflora Aiton
Small-flowered Agrimony
Occasional. Thinly wooded and open WET-MEADOW, FEN, and SHRUB-CARR.

Agrimonia pubescens Wallr.
Soft Agrimony
Occasional. OAK-HARDWOOD-FOREST and shady situations in all kinds of oak savanna.

Agrimonia rostellata Wallr.
Very rare. First collected in Kalamazoo County by MNFI botanists at Fort Custer in 1994 from OAK-HARDWOOD-FOREST and associated sandy disturbed ground. So far known only from the NE¼ of the county, but potentially overlooked elsewhere. Not in Hanes & Hanes (1947).

Amelanchier arborea (Michaux f.) Fern.
Juneberry
Occasional. Usually on relatively dry hillsides in OAK-HARDWOOD-FOREST, SUGAR-MAPLE-FOREST, and hillside prairie, often overlooking lakes. Some of the Haneses *A. laevis* is included here.

Amelanchier interior Nielsen
Occasional. OAK-HARDWOOD-FOREST and SUGAR-MAPLE-FOREST. This species was included in the Haneses' (1947) *A. arborea*.

Amelanchier laevis Wieg.
Shadbush Serviceberry
Occasional. SUGAR-MAPLE-FOREST and OAK-HARDWOOD-FOREST.

Amelanchier spicata (Lam.) K. Koch **Hanes:** *A. humilis*
Occasional. Dry, often disturbed, and hilly OAK-HARDWOOD-FOREST.

Aronia prunifolia (Marsh.) Rehder
Chokeberry
Current status uncertain. RED-MAPLE-SWAMP, BOG, TAMARACK-SWAMP, and rarely in low areas in otherwise drier forests. The Haneses' (1947) *Aronia melanocarpa* is included here since it is doubtfully distinct from *A. prunifolia* in Kalamazoo County (Voss 1985).

Crataegus calpodendron (Ehrh.) Medicus
Current status unknown. The Haneses found this species to be relatively more common in the "E part of the county."

Crataegus coccinea complex
Current status unknown. Collected by the Haneses from a diversity of situations in the W½ of the county. Includes the Haneses' (1947) *C. holmesiana,* and *C. pedicellata*.

Crataegus crus-galli L.
Cockspur Thorn
"Infrequent" according to the Haneses (1947). Now occasional in pastures, old fields, and other disturbed situations.

Crataegus disperma Ashe
Current status unknown. Reported by the Haneses only from the F. W. Rapp woods in section 24 of Brady Tp. A portion of this forest has been converted to horse pasture.

Crataegus flabellata complex
Current status unknown. Collected by the Haneses from a diversity of situations throughout the county. Includes the Haneses' (1947) *C. gravis, C. macrosperma, C. multifida,* and probably *C. filipes.*

Crataegus intricata Lange
Current status unknown. OAK-HARDWOOD-FOREST in the W½ of the county.

Crataegus laevigata (Poiret) DC. **Hanes:** *C. oxycantha*
English Hawthorn
Current status unknown. One of only 3 collections assigned to this complex from the state. The only specimen from Kalamazoo County (5416 WMU) was collected by F. W. Rapp in 1941 at "Frank Reeds" marsh in Vicksburg where it was growing on a "sandy knoll." This specimen is sterile. Not native.

Crataegus margaretta Ashe
Current status unknown. Old fields, fencerows, and disturbed young forest.

Crataegus pruinosa (Wendl.) K. Koch.
Current status unknown. Collected by the Haneses from swamp borders and other unspecified forested situations. Includes the Haneses' (1947) *C. bellula, C. horridula* & *C. latisepala*.

Crataegus punctata Jacq
Dotted Hawthorn
Occasional. SUGAR-MAPLE-FOREST, OAK-HARDWOOD-FOREST, and old fields.

Crataegus succulenta Link
Current status unknown. Known from a single specimen collected in section 29 of Wakeshma Tp. by the Haneses.

Filipendula rubra (Hill) Robinson
Queen-of-the-prairie
Very rare. Once occasional in WET-PRAIRIE/WET-MEADOW along the Kalamazoo River and Portage Creek, and in lakeside FEN and SHRUB-CARR in Camp Custer. Now extirpated outside of Fort Custer (once called Camp Custer, and one of the same sites reported by the Haneses) where it is apparently being shaded out by other vegetation. Here it is associated with *Potentilla fruticosa, Scirpus acutus, Carex stricta,* and *Sorghastrum nutans* on muck (P. Higman pers. comm. 1997). Also once known from along the W branch of Portage Creek downstream from Milham Park (along the RR right-of-way), but this population was destroyed during sewer construction (R. Brewer pers. comm. 2001).

Fragaria virginiana Miller
Wild Strawberry
Occasional. In a diversity of more or less open habitats including old fields, OAK-HARDWOOD-FOREST, mesic to dry oak savannas, TERRESTRIAL-PRAIRIE, and WET-PRAIRIE.

The hybrid *Fragaria ×anassa* (*F. virginiana* × *F. chiloënsis*), Common Cultivated Strawberry, was once known from the "Island" woods W of Schoolcraft and from "an orchard W of Schoolcraft" (Reported in Hanes & Hanes (1947) as *F. chiloënsis*). Current status unknown.

Geum aleppicum Jacq.
Yellow Avens
Occasional. WET-MEADOW and FEN, usually growing in muck.

Geum canadense Jacq.
White Avens
Occasional. SUGAR-MAPLE-FOREST, OAK-HARDWOOD-FOREST, and BLACK-OAK-BARREN.

Geum laciniatum Murray
Rough Avens
Current status uncertain. WET-MEADOW.

Geum rivale L.
Water Avens; Purple Avens
Occasional. TAMARACK-SWAMP, WET-MEADOW, FEN, and RED-MAPLE-SWAMP.

Malus coronaria (L.) Miller
Wild, American, or Sweet Crab
Occasional. Fencerows, roadsides, and disturbed terrestrial forests.

Malus pumila Miller
Apple
Occasional. Fencerows, roadsides, lakeshores, and disturbed terrestrial forests. Not native.

Physocarpus opulifolius (L.) Maxim.
Ninebark
Current status uncertain. FLOODPLAIN-FOREST and HARDWOOD-SWAMP along the Kalamazoo River, Augusta Creek, and Spring Brook. Occasional in thickets along Arcadia (Bronson) Creek near the former right-of-way of the Michigan Central RR (est. before the area was cultivated) in former oak savanna (but may be adventive at this site). Appears to prefer slightly alkaline stream and river edges and occasionally adjacent wetlands. The Haneses report a shrub from E of Paw Paw Lake in a "swamp." Occasionally cultivated.

Porteranthus trifoliatus (L.) Britton
Bowman's Root
Current status uncertain, very rare if still extant. Collected in 1978 by H. E. Ballard (the first collection for Michigan) "on the border of a clearing in oak woods in Schoolcraft Tp." (Ballard 1985; Voss 1985). There was a "small population" of plants at that time (H. E. Ballard pers. comm. 2002). Has not been relocated despite repeated attempts, but the exact former location remains to be identified with certainty.

Potentilla anserina L.
Silverweed
Rare. Reported by the Haneses from several ponds on Prairie Ronde and from one other wetland site, the status of which is unknown. I am only aware of a few extant sites for this species in EM-MARSH on Prairie Ronde. Many former sites have been seriously altered by draining, pasturing, and cultivation.

Potentilla argentea L.
Silvery Cinquefoil
Occasional. Dry disturbed situations.

Potentilla arguta Pursh
Tall or Prairie Cinquefoil
Extinct. Collected by the Haneses from the SW¼ of the county along roadsides through former TERRESTRIAL-PRAIRIE, in "Camp Custer", and "near Pretty Lake." Reported by Brewer (1984) from the former right-of-way of the MI Central RR on the N edge of Genesee Prairie. No longer extant at any of the aforementioned sites.

Potentilla fruticosa L.
Shrubby Cinquefoil
Occasional. FEN and WET-MEADOW.

Potentilla norvegica L.
Rough Cinquefoil
Occasional. RR rights-of-way, roadsides, and generally in dry, open, disturbed situations throughout. *Potentilla monspeliensis* L. is included here. Both native *P. monospeliensis* and introduced *P. norvegica* appear to occur in Kalamazoo County. The two are scarcely distinct due to apparent hybridization and introgression (see Voss 1985).

Potentilla palustris (L.) Scop.
Marsh Cinquefoil
Occasional. FEN and wet depressions in BOG.

Potentilla recta L.
Rough-fruited Cinquefoil
Occasional. RR rights-of-way, roadsides, and old fields, usually in sand. Invading disturbed BLACK-OAK-BARREN and open OAK-HARDWOOD-FOREST. Not native.

Potentilla simplex Michaux
Common or Old-field Cinquefoil
Occasional. Sandy open situations.

Prunus americana Marsh.
Wild Plum
Common. Terrestrial forests, fencerows, and old fields.

Prunus avium (L.) L.
Sweet Cherry
Occasional. Collected by the Haneses from near a creek in section 31 of Schoolcraft Tp. Apparently not yet widespread at that time (1947). Not native. Mature trees can now be found throughout the county in sandy OAK-HARDWOOD-FOREST, especially near the city of Kalamazoo.

Prunus cerasus L.
Sour or Pie Cherry
Current status unknown. Collected by the Haneses from the "Island" woods. Not native.

Prunus domestica L.
Common Plum
Current status unknown. Collected by the Haneses from their property in Schoolcraft, and from near an old orchard, both in 1935. Not native. Not in Hanes & Hanes (1947).

Prunus mahaleb L.
Perfumed Cherry
Locally established. First collected by Betty Muthiani on 16 May 1969 from sections 3, 4, 9, and 17 in Charleston Tp. Later collected 13 May 1976 from near Asylum Lake. Still locally established near Asylum Lake and no doubt elsewhere. Not native. Not in Hanes & Hanes (1947).

Prunus nigra Aiton
Canada Plum
Locally established. First collected 1 June 1976 by M. McCann from a ridge E of Asylum Lake in section 30 of Kalamazoo Tp. Collected at this same site again in 1992. Not in Hanes & Hanes (1947).

Prunus pensylvanica L. f.
Pin or Fire Cherry
Occasional. Sandy OAK-HARDWOOD-FOREST.

Prunus persica (L.) Batsch
Peach
Rarely escaped along roadways.

Prunus pumila L. **Hanes:** *P. susquehanae*
Sand Cherry
Very rare. Collected by the Haneses from several sites in relatively dry former oak savanna. Now known only from a small population near Hampton Creek in a power line right-of-way passing through sandy overgrown former oak savanna. Other extant populations may persist, but this plant is now clearly very rare. All specimens are of the var. *susquehanae*.

Prunus serotina Ehrh.
Wild Black Cherry
Common. Diverse terrestrial situations, especially sandy old fields, BLACK-OAK-BARREN, and fencerows.

Prunus spinosa L.
Sloe; Blackthorn
Current status unknown. Collected by the Haneses from an old homesite and associated thicket in Texas Tp. Not native.

Prunus virginiana L.
Choke Cherry
Occasional. SUGAR-MAPLE-FOREST, OAK-HARDWOOD-FOREST, and fencerows.

Pyrus communis L.
Pear
Rare. Fencerows, old fields, roadsides, and persisting on old homesites.

Rosa arkansana Porter **Hanes:** *R. pratincola* & *R. suffulata*
Prairie Rose
Current status unknown. Collected by the Haneses in 1936 from along a RR right-of-way. Possibly adventive.

Rosa carolina L.
Pasture Rose
Occasional. Old fields, fencerows, RR rights-of-way, and roadsides.

Rosa centifolia L.
Cabbage Rose
Current status unknown. Collected by the Haneses from roadsides and old homesites. May only persist where once cultivated.

Rosa cinnamomea L.
Cinnamon Rose
Occasional. Roadsides, usually in relatively sandy soils. Not native.

Rosa eglanteria L. **Hanes:** *R. rubiginosa*
Sweetbrier
Current status unknown. Collected by the Haneses in 1936 from near the "Island" marsh just W of Schoolcraft, and by F. W. Rapp in 1940 from a roadside W of Vicksburg. Not native.

Rosa gallica L.
French Rose
Current status unknown. Collected by the Haneses from roadsides and old homesites. Not native.

Rosa multiflora Murray
Multiflora or Japanese Rose
Occasional. Often planted and frequently escaping from cultivation. Widely established.

Rosa palustris Marsh.
Swamp Rose
Occasional. TAMARACK-SWAMP, RED-MAPLE-SWAMP, SHRUB-CARR, WET-MEADOW, and BOG.

Rosa setigera Michaux
Prairie Rose
Extinct. Collected by the Haneses from the "Island" W of Schoolcraft. Collected by A. C. Roberts 1.5 mi. S of Kalamazoo by Portage St. and "the Lake Shore Michigan Southern Railway" on June 27 1899 (KVM). A few other reports from the county are apparently based on misidentified material. I am aware of no extant plants in Kalamazoo County. Probably once modal in open OAK-HARDWOOD-FOREST, prairie thickets, and oak savanna, but relatively little is known about this species in Kalamazoo County.

Rosa spinosissima L.
Scotch Rose
Current status unknown. Collected by the Haneses from roadsides in section 14 of Cooper Tp. and section 16 of Ross Tp. Not native.

Rubus alleghaniensis Porter
Common Blackberry
Common. Openings in SUGAR-MAPLE-FOREST, OAK-HARDWOOD-FOREST, in "thickets," and generally in disturbed situations throughout. Includes the Haneses' (1947) *R. perspicuus* in part, *R. rappii*, and *R. rosa*.

Rubus canadensis L.
Current status unknown. Collected by the Haneses (and reportedly "rare") near roadside ditches and in other disturbed relatively open situations in Brady, Climax, and Wakeshma Tps. May be introduced. Unusually far south here. No other collections are known from south lower Michigan (see Voss 1985). Includes the Haneses' (1947) *R. laetabilis*.

Rubus flagellaris Willd.
Northern Dewberry
Common. RR rights-of-way, BLACK-OAK-BARREN, and other open disturbed situations. I agree with Voss (1985) who suggests that several species may be grouped under this name. Includes the Haneses' (1947) *R. baileyanus, R. exutus*, *R. florenceae*, *R. meracus*, *R. michiganensis* (in part), *R. pauper* (in part), *R. schoolcraftianus*, *R. tantalus*, *R. tenuicaulis*, and *R. vagus*.

Rubus hispidus L.
Swamp Dewberry
Occasional. RED-MAPLE-SWAMP, TAMARACK-SWAMP, and ecotone between terrestrial forest and FEN, BOG, and WET-MEADOW. Includes the Haneses' (1947) *R. distinctus*, *R. kalamazooensis* (in part), and *R. plus*.

Rubus occidentalis L.
Black Raspberry
Occasional. Disturbed situations, including terrestrial roadsides, open SUGAR-MAPLE-FOREST, OAK-HARDWOOD-FOREST, and fencerows.

Rubus pensilvanicus Poiret **Hanes:** *R. abactus, R. associus*, *R. cauliflorus, R. hanesii*, *R. licens*, *R. limulus*, *R. localis*, *R. michiganensis* (in part), *R. pauper* (in part), *R. uvidus*, and *R. variispinus* (in part).

Common. Almost any terrestrial situation imaginable except deeply shaded forest, including 10 meters above the ground in a large wind-damaged Black Oak!

Rubus pubescens Raf.
Dwarf Raspberry
Occasional. TAMARACK-SWAMP and RED-MAPLE-SWAMP.

Rubus setosus Bigelow **Hanes:** *R. conabilis, R. dissensus, R. jejunus, R. mediocris, R. perspicuus* (in part), *R. potis*, *R. variispinus* (in part), & *R. wheeleri.*
Occasional. Sandy old fields, BLACK-OAK-BARREN, and the sandy edges of EM-MARSH, FEN, and BOG. Voss (1985) suggests that several taxa may be grouped here.

Rubus strigosus Michaux
Wild Red Raspberry
Occasional. Diverse, mostly terrestrial situations in full to partial sun.

Sorbaria sorbifolia (L.) A. Br.
False Spiraea
Current status unknown. Roadsides and old homesites. Not native.

Sorbus aucuparia L.
European Mountain-ash; Rowan
Current status unknown. A single tree was reported by the Haneses, "on the border of a swale in section 18 of Cooper Tp." This species is widely planted, but I have not seen it growing outside of cultivation in Kalamazoo County. Not native.

Sorbus decora (Sarg.) Schneider
Showy Mountain Ash
Current status uncertain, very rare if still extant. Collected by the Haneses from section 30 of Charleston Tp., and mention is made of trees once known by H. R. Becker near Portage Lake (Charleston Tp.). Probably native, but here at the S edge of its known range in Michigan.

Spiraea alba Duroi
Meadowsweet
Occasional. WET-PRAIRIE, FEN, WET-MEADOW, and SHRUB-CARR.

Spiraea tomentosa L.
Hardhack; Steeplebush
Occasional. BOG, sandy acidic WET-PRAIRIE, WET-MEADOW, SHRUB-CARR, COASTAL-PLAIN-MARSH, and EM-MARSH. Typically more of an acidophile than *S. alba*.

LEGUMINOSAE (FABACEAE) **Pea Family**

Several species in the genus *Desmodium* are reported here based primarily upon annotations made to herbarium specimens at WMU by E. G. Voss and mapped in Volume II. of Michigan Flora (1985).

Amorpha canescens Pursh
Lead-plant
Rare. Collected from BLACK-OAK-BARREN, TERRESTRIAL-PRAIRIE, WHITE-OAK-SAVANNA, BUR-OAK-SAVANNA, and open OAK-HARDWOOD-FOREST, mostly in the W½ of the county, but probably an important component of all mesic to dry pre-European settlement terrestrial oak savanna and prairie plant communities. Now rare throughout in disturbed BLACK-OAK-BARREN, WHITE-OAK-SAVANNA, and OAK-HARDWOOD-FOREST. Declining due to widening of roadways, removal of fencerows, herbicide spraying and other disturbance along RR rights-of-way, development of oak savanna remnants, and fire suppression (resulting in canopy development in BLACK-OAK-BARREN, WHITE-OAK-SAVANNA, and formerly open OAK-HARDWOOD-FOREST). In 1989, a few plants from a former site at the intersection of I-94 and Oakland Dr. were transplanted to a BLACK-OAK-BARREN reconstruction on the W side of Angling Rd., just S of the

commuter lot near Centre St. This was prior to construction work under the direction of MDOT botanist, Kim Herman. Reported by A. C. Roberts to be persisting on Prospect Hill (former WHITE-OAK-SAVANNA) in downtown Kalamazoo on 11 July 1904 (KVM). No longer extant at this site. Lead-plant is usually a good indicator of relatively high quality savanna/prairie since it rarely persists following cultivation, and rarely establishes outside of remnant former prairie and savanna.

Amorpha fruticosa L.
False Indigo
Current status unknown. Collected by C. R. Hanes from the Kellogg Forest on 23 June 1955. His notes read; "prolific escape" (MICH). Adventive. Not in Hanes & Hanes (1947).

Amphicarpaea bracteata (L.) Fern.
Hog-peanut
Occasional. WET-PRAIRIE, OAK-HARDWOOD-FOREST edges, oak savanna, TERRESTRIAL-PRAIRIE, and generally along roadsides and RR rights-of-way.

Apios americana Medicus
Groundnut; Wild-bean; Indian-potato
Occasional. FEN, WET-PRAIRIE, and other open moist situations, usually near lakes or streams.

Astragalus canadensis L.
Canada Milk-vetch
Current status uncertain, very rare if still extant. Collected by the Haneses from the margin of the "Island" pond, and from the edge of Harrison Lake, both on Prairie Ronde. Not found in several site visits from 1995–2002.

Astragalus neglectus (T. & G.) Sheldon
Cooper's Milk-vetch
Current status uncertain, very rare if still extant. Reported by the Haneses from the margin of "Patton's Marsh" (NW of Schoolcraft) and from a grassy clearing alongside Harrison Lake, both on Prairie Ronde. Most recently collected on 10 August 1954 by W. J. Gilbert (ALBC) from a roadside NW of Schoolcraft, possibly at one of the aforementioned sites. Not found in several site visits from 1995–2002.

Baptisia lactea (Raf.) Thieret. **Hanes:** *B. leucantha*
White Wild Indigo
Rare. Once relatively common, and still persisting locally on roadsides and along RR rights-of-way through former TERRESTRIAL-PRAIRIE and adjacent former oak savanna. Rapidly declining due to the removal of fencerows, widening of roads, poor seed set (pers. obs.), and herbicide spraying and other disturbance to RR rights-of-way.

Baptisia leucophaea Nutt.
Cream Wild Indigo
Extinct. Collected by the Haneses from roadsides and RR rights-of-way on Prairie Ronde, and from the edge of a pond in overgrown oak savanna in Texas Tp. Collected by the first botanical survey on Grand Prairie, 1 August 1838 (NY). Last seen in Kalamazoo County by the Haneses in 1953. The few records from Kalamazoo County indicate that this species flowered in May, well before *B. lactea*, and set seed in mid-June.

Baptisia tinctoria (L.) R. Br.
Yellow Wild Indigo
Current status uncertain, very rare if still extant. Known only from a Hanes collection made in open woods E of Mud Lake, Pavilion Tp. Some open OAK-HARDWOOD-FOREST and regenerating sandy old fields (resembling BLACK-OAK-BARREN) remain at this site, but I have not found any plants.

Cassia chamaecrista L. **Hanes:** *C. fasciculata*
Partridge-pea
Current status unknown. Collected by the Haneses from "the Grand Trunk Railway one mi. NE of Pavilion." Not native.

Cassia hebecarpa Fern.
Wild Senna
Current status uncertain. Collected by the Haneses from near the Kalamazoo River on "Islands" and from undescribed situations in Cooper Tp., sections 23 and 24 of Comstock Tp., and "E of Galesburg." Collected by A. C. Roberts on 9 April 1899, 3 mi. N of Kalamazoo along a RR right-of-way and near "Riverside Cemetery" (KVM). Perhaps once a component of prairie and prairie-like openings along the Kalamazoo R.

Cercis canadensis L.
Redbud; Judas Tree
Once relatively rare. Collected by the Haneses only from near the Kalamazoo River in SUGAR-MAPLE-FOREST and FLOODPLAIN-FOREST. Now occasional throughout, usually at wood edges. Both native and introduced plants now occur here.

Coronilla varia L.
Crown-vetch
Common. Roadsides and RR rights-of-way. Often planted. A European introduction widely used for erosion control. Not native.

Crotalaria sagittalis L.
Rattlebox
Collected by the Haneses from along a RR right-of-way E of Schoolcraft. No longer known. Probably adventive.

Desmodium canadense (L.) DC.
Showy Tick Trefoil
Occasional. Moist to wet open situations including sandy WET-PRAIRIE and depressions in oak savanna.

Desmodium canescens (L.) DC.
Hoary Tick Trefoil
Current status uncertain. Known only from collections made by the Haneses in 1944 and 1945 from "along a road through woods near the Nesbitt farm in Section 4 Prairie Ronde Tp.," the "Nesbitt woods," and "woods W of Twin lakes Alamo Tp."

Desmodium ciliare (Willd.) DC.
Hairy Small-leaved Tick Trefoil
Current status uncertain. Collected by the Haneses from sandy soil at "Spring Brook along the C. K. & S. RR", "3 mi. E of Schoolcraft along the Grand Trunk RR," "NE of Crooked Lake," in Fort Custer, and in the Kleinstuck Reserve.

Desmodium cuspidatum (Willd.) Loudon
Current status uncertain. Known only from a first survey collection made on 3 August 1838 in "dry openings" (MICH), and a Hanes specimen labeled *D. bracteosum* that was collected 26 August 1935 from "thickets and thin woods." The Hanes specimen has multiple locality labels; Swartz, Austin Lake, Eagle Lake, and N. of Paw Paw Lake (the first name on the label (Swartz) is probably where the specimen was collected).

Desmodium glutinosum (Willd.) Wood
Pointed-leaved Tick Trefoil
Occasional. OAK-HARDWOOD-FOREST. Includes the Haneses' (1947) *D. bracteosum*.

Desmodium illinoense A. Gray
Illinois Tick Trefoil
Rare. Known from roadsides and RR rights-of-way, mostly in the SW¼ of the county.

Desmodium marilandicum (L.) DC.
Smooth Small-leaved Tick Trefoil
Current status unknown. Collected by the Haneses from the SW¼ of the county in "light sandy soil."

Desmodium nudiflorum (L.) DC.
Naked-flowered Tick Trefoil
Occasional. OAK-HARDWOOD-FOREST.

Desmodium obtusum (Willd.) DC. **Hanes:** *D. rigidum*
Rigid Tick Trefoil
Current status unknown. Collected by the Haneses from ". . . a sandy bank N of a small creek in section 6 of Portage Tp."

Desmodium paniculatum (L.) DC.
Panicled Tick Trefoil
Occasional. OAK-HARDWOOD-FOREST and disturbed BLACK-OAK-BARREN, but also in wetland edges and other habitats. Our specimens appear to be of both the var. *paniculatum* and the var. *dillenii* (the Haneses' (1947) *D. dillenii*).

Desmodium rotundifolium DC. **Hanes:** *D. rotundiflorum*
Round-leaved Tick Trefoil
Occasional. Sandy OAK-HARDWOOD-FOREST.

Desmodium sessilifolium (Torrey) T. & G.
Sessile-leaved Tick Trefoil
Current status uncertain. Mostly in the W½ of the county. Usually in the sandy soil of overgrown BLACK-OAK-BARREN and disturbed OAK-HARDWOOD-FOREST.

Gleditsia triacanthos L.
Honey Locust
Occasional. Mostly along the Kalamazoo River, but found sparingly elsewhere in moist to wet forests and disturbed situations. Probably adventive outside of FLOODPLAIN-FOREST and HARDWOOD-SWAMP in the vicinity of the Kalamazoo River and Augusta Creek. The Haneses collected the forma *inermis* (without spines) from forest E of Galesburg and in section 27 of Comstock Tp. I have not tried to relocate trees at either site. All of the trees I have seen of the forma *inermis* grow in disturbed situations and appear to be escapes from cultivation.

Gymnocladus dioicus (L.) K. Koch **Hanes:** *G. dioica*
Kentucky Coffee-tree
Rare. HARDWOOD-SWAMP in the SE¼ of the county. Most trees have their roots flooded in the spring, and most known sites are not far from small creeks. Probably once also occurred near the Kalamazoo River. Most extant native trees occur in N Wakeshma Tp. Occasionally planted.

Lathyrus latifolius L.
Perennial or Everlasting Pea
Rare to occasional. Escape from cultivation.

Lathyrus ochroleucus Hooker
Pale Vetchling
Occasional. Dry, relatively open OAK-HARDWOOD-FOREST primarily in the W½ of the county.

Lathyrus palustris L.
Marsh Pea
Occasional. WET-MEADOW, WET-PRAIRIE, FEN, SHRUB-CARR, and alongside lakes and ponds in EM-MARSH.

Lathyrus venosus Willd.
Occasional. Dry, usually sandy soil along roadsides and RR rights-of-way, and in OAK-HARD-WOOD-FOREST, TERRESTRIAL-PRAIRIE, and oak savanna.

Lespedeza capitata Michaux
Common. TERRESTRIAL-PRAIRIE, oak savanna, and roadsides and RR rights-of-way through these plant communities.

Lespedeza cuneata (Dumont) G. Don
Sericea
Current status unknown. Collected by the Haneses from section 20 of Oshtemo Tp., from E of Cooper, and from section 29 of Brady Tp. Not native.

Lespedeza hirta (L.) Hornem
Common. BLACK-OAK-BARREN, OAK-HARDWOOD-FOREST, and open, sandy, disturbed ground. Most frequent in the W½ of the county.

The hybrid *L. hirta* × *L. intermedia* (the Haneses' *L.* ×*nutallii*) is known from Kalamazoo county. This hybrid has spreading hairs on the stem, but otherwise is quite similar to *L. intermedia* (Voss 1985).

Lespedeza intermedia (Watson) Britton
Occasional. Hillsides in thinly wooded OAK-HARDWOOD-FOREST (including hillside prairie), in BLACK-OAK-BARREN, and in other relatively open, often sandy situations primarily in the W½ of the county. Known to hybridize with *L. hirta* (see *L. hirta*).

Lespedeza stipulacea Maxim.
Korean Bush-clover
Current status unknown. Collected by the Haneses from a bank N of Pretty Lake and from a field near "Cooper's Glenn." Not native.

Lespedeza violacea (L.) Pers.
Current status unknown. Collected by the Haneses from "wooded banks" (resembling hillside prairie, but with a nearly closed canopy). There are at least 6 previously known sites, all near or alongside lakes and streams in the central and W portions of the county.

Lespedeza virginica (L.) Britton
Rare. Open OAK-HARDWOOD-FOREST and WHITE-OAK-SAVANNA, primarily in the W½ of the county.

Lotus corniculata
Birdfoot Treefoil
Occasional. Roadsides, RR rights-of-way, and similar open, disturbed situations. Not in Hanes & Hanes (1947). Not native.

Lupinus perennis L.
Wild Lupine
Rare. BLACK-OAK-BARREN, openings in OAK-HARDWOOD-FOREST, and droughty WHITE-OAK-SAVANNA. Formerly common in the W½ of the county.

Medicago lupulina L.
Black Medic
Common. Lawns, pastures, roadsides, and RR rights-of-way. Not native.

Medicago sativa L.
Alfalfa
Occasional. Roadsides, RR rights-of-way, old fields, and waste places. A yellow-flowered plant, long-known as *M. falcata* L. (the Haneses' (1947) *M. falcata*), Yellow-flowered Alfalfa, is probably closest to *M. sativa* (Voss 1985), and is included here despite some disagreement among taxonomists as to its actual specific status (Hanes 1938). The taxon known as ssp. ×*varia* is also known from Kalamazoo County (Rabeler & Gereau 1983). Not native.

Melilotus alba Medicus
White Sweet-clover
Common. Disturbed, relatively open situations. Widely established.

Melilotus officinalis (L.) Pallas
Yellow Sweet-clover
Common. Disturbed, relatively open situations. Widely established.

Robinia hispida L.
Bristly Locust; Rose-acacia
Common. Roadsides and fencerows. Widely established.

Robinia pseudoacacia L.
Black Locust
Common. At wood edges, and almost everywhere else in droughty soils (Hanes 1956). Slowly invading our few remaining terrestrial oak savanna and TERRESTRIAL-PRAIRIE remnants. A serious threat to our prairie and savanna flora. Widely established.

Tephrosia virginiana (L.) Pers.
Goat's-rue; Rabbit-pea
Collected by the Haneses primarily from the W½ of the county in sandy BLACK-OAK-BARREN, and open OAK-HARDWOOD-FOREST. Now very rare in the same situations.

Trifolium arvense L.
Rabbitfoot Clover
Occasional. Lawns, roadsides, and old fields in dry sandy soil. Not native.

Trifolium aureum Poll. **Hanes:** *T. agrarium*
Hop Clover
Current status unknown. Known from many scattered collections. First collected by A. C. Roberts on 25 June 1898 from an unspecified location, probably near the city of Kalamazoo (KVM). Not native.

Trifolium campestre Schreber **Hanes:** *T. procumbens*
Low Hop Clover
Current status unknown. Collected by the Haneses from the lawn of the Kellogg Bird Sanctuary (Ross Tp.) and from S of Vicksburg. Not native.

Trifolium dubium Sibth.
Little Hop Clover
Occasional. Lawns and roadsides. Not native.

Trifolium hybridum L.
Alsike Clover
Occasional. Pastures and roadsides. Not native.

Trifolium pratense L.
Red Clover
Common. Lawns, gardens, old fields, roadsides, waste places, pastures, and RR rights-of-way. Not native.

Trifolium repens L.
White Clover
Common. Roadsides, pastures, and lawns. Not native.

Vicia americana Willd.
American Vetch
Occasional. Roadsides, RR rights-of-way, fencerows, and old fields.

Vicia caroliniana Walter
Pale or Wood Vetch
Occasional. OAK-HARDWOOD-FOREST. Not native.

Vicia cracca L.
Bird Vetch
Occasional. Roadsides, RR rights-of-way, and old fields. Not native.

Vicia sativa L. **Hanes:** *V. cracca* & *V. angustifolia*
Common or Spring Vetch
Current status unknown. Collected by the Haneses in Schoolcraft at the "RR station" in 1938, and by C. N. Harvey with no information except an annotation in her hand reading "in prairie." Not native.

Vicia villosa Roth.
Hairy Vetch
Occasional. Roadsides, RR rights-of-way, and old fields. The ssp. *varia* was collected by the Haneses from an old RR right-of-way in section 7 of Texas Tp. (In Hanes & Hanes as *V. dasycarpa*). Not native.

LINACEAE **Flax Family**

Linum striatum Walter
Current status uncertain. Collected by the Haneses from "moist marshy meadows" on the N and S shores of Bonnie Castle Lake.

Linum sulcatum Riddell
Extinct. The only collections known were made by the first botanical survey in 1838; one is from Grand Prairie, and another lacks habitat and locality data (MICH, NY). Not in Hanes & Hanes (1947).

Linum usitatissimum L.
Common Flax
Current status unknown. Reportedly collected on 25 September 1903 from a pasture in Prairie Ronde Tp. This report comes from a ledger of specimens collected by a Mr. Burgess (first name unknown) "and sent to Chicago" (this ledger is filed in the Hanes herbarium at WMU). The only known extant herbarium specimen was collected by Ollie Hoyt on 5 August 1951 from along the GTRR right-of-way in Section 27 Prairie Ronde Tp. (WMU). Not native. Not in Hanes & Hanes (1947).

Linum virginianum L.
Current status uncertain. Collected by the Haneses from remnant oak savanna, the shore of Sherman Lake, and a "low woodland on the E shore of Austin Lake."

OXALIDACEAE **Oxalis or Wood-sorrel Family**

Oxalis fontana Bunge **Hanes:** *O. europaea*
Common. Lawns, gardens, and other relatively open disturbed situations.

Oxalis stricta L.
Common. Disturbed, often sandy, but rarely dry, soil. More common in the W½ of the county than elsewhere. Collected from "rich prairie" near Schoolcraft in 1903 but not thought to be native.

GERANIACEAE **Geranium Family**

Erodium cicutarium L'Hér
Stork's-bill; Alfileria
Occasional. Roadsides, RR right-of-ways, lawns, and other disturbed situations. Widely established.

Geranium aequale Aedo
Known only from a collection made by R. W. Pippen in 1969 from the lawn in front of Siedschlag Hall on the WMU campus. Not native. Not in Hanes & Hanes (1947). Included in *G. molle* L. in Voss (1985).

Geranium carolinianum L.
Occasional. RR rights-of-way, roadsides, and lawns.

Geranium maculatum L.
Occasional. OAK-HARDWOOD-FOREST edges.

Geranium pusillum L.
Common. Gardens, roadsides, and lawns. Not native.

Geranium robertianum L.
Herb Robert
Common. SUGAR-MAPLE-FOREST and OAK-HARDWOOD-FOREST.

ZYGOPHYLLACEAE **Caltrop Family**

Tribulus terrestris L.
Caltrop; Puncture Vine
Current status unknown. Collected by the Haneses in 1936 from a RR right-of-way near Schoolcraft (Hanes 1938). Not native.

RUTACEAE **Rue Family**

Ptelea trifoliata L.
Hop-tree; Water-ash
Current status uncertain, very rare if still extant. Collected only by the Haneses from a fencerow in section 36 of Prairie Ronde Tp. No other collections are known.

Zanthoxylum americanum Miller
Prickly-ash
Common. ASH-SWAMP and occasionally other swamp forests.

SIMAROUBACEAE **Quassia Family**

Ailanthus altissima (P. Mill.) Swingle
Tree-of-Heaven
Common. Especially frequent in urban areas growing in waste places of all kinds. Persists in poor soils where few other woody plants will grow. Widely established.

POLYGALACEAE **Milkwort Family**

Polygala cruciata L.
Cross-leaved Milkwort
Very rare. COASTAL-PLAIN-MARSH. Once relatively common, but now nearly extinct. Decline is apparently due to shrub growth, stabilization of water levels, development, draining, and recreational damage to sandy lakeshores and marshes. A large population (thousands of plants) was reported by the Haneses on the "marshy edge of an ancient sand dune near the S shore of West Lake." I have been unable to relocate this site. The lakeshore of West Lake has since been altered significantly by development.

Polygala polygama Walter
Racemed Milkwort
Occasional. BLACK-OAK-BARREN and OAK-HARDWOOD-FOREST.

Polygala sanguinea L.
Field Milkwort
Occasional. BLACK-OAK-BARREN and sandy lakeshores.

Polygala senega L.
Seneca Snakeroot; Senega Root
Rare. Collected by the Haneses from FEN, WET-PRAIRIE, TERRESTRIAL-PRAIRIE, and other undescribed moist to wet open situations. Today known only from prairie FEN.

Polygala verticillata L.
Whorled Milkwort
Current status uncertain, very rare if still extant. Collected by the Haneses from BLACK-OAK-BARREN, dry sandy old fields, and from RR rights-of-way. Not since collected or observed.

EUPHORBIACEAE **Spurge Family**

Acalypha rhomboidea Raf.
Three-seeded Mercury
Occasional. Roadsides and other moist situations, but generally rather weedy everywhere.

Croton monanthogynus Michaux
Prairie-tea
Current status uncertain. Collected by the Haneses from an "open wood near the N shore of Wyman Lake, Oshtemo Tp." (Hanes 1943). Native further W, this is the only known Michigan record for this species. An annual. Probably adventive.

Euphorbia corollata L.
Flowering Spurge
Common. Old fields, oak savanna, TERRESTRIAL-PRAIRIE, roadsides, and RR rights-of-way.

Euphorbia cyparissias L.
Cypress Spurge
Occasional. Roadsides and other waste places. May persist after cultivation. Not native.

Euphorbia dentata Michaux
Toothed Spurge
Rare. Dry sandy situations including roadsides and RR rights-of-way. Not native.

Euphorbia esula L.
Leafy Spurge
Occasional. Pastures, lawns, and waste places. Not native.

Euphorbia glyptosperma Engelm.
Ridge-seeded Spurge
Occasional? Roadsides and RR rights-of-way, usually in dry, sandy soil.

Euphorbia maculata L.
Occasional. Roadsides and other waste places. Includes the Haneses' (1947) *E. supina.*

Euphorbia marginata Pursh
Snow-on-the-mountain
Current status uncertain. An escape from cultivation or just persisting where once cultivated.

Euphorbia nutans Lag.
Nodding Spurge
Occasional. Moist open situations such as in lawns. Reported (but without a specimen) as early as 1903 along RR rights-of-way in Schoolcraft. Not in Hanes & Hanes (1947). Included in the Haneses' (1947) *E. maculata*.

Euphorbia peplus L.
Petty Spurge
Rare. Lawns and roadsides. Locally established.

Euphorbia vermiculata Raf.
Petty Spurge
Current status uncertain. Moist open lawns and gardens. Not native. Not in Hanes & Hanes (1947).

LIMNANTHACEAE **False Mermaid Family**

Floerkea proserpinacoides Willd.
False Mermaid
Occasional. SUGAR-MAPLE-FOREST, primarily in the S½ of the county.

ANACARDIACEAE **Cashew Family**

Rhus aromatica Aiton
Fragrant Sumac
Very rare. Planted in "prairie plantings" at Oakland Dr. near the expressway, otherwise known only from "woods," a "slope," and "high ground above the W bank of Wintergreen Lake," all in the NE¼ SE¼ section 6 of Ross Tp. (KBSMS). Not in Hanes & Hanes (1947).

Rhus copallina L.
Shining or Dwarf Sumac
Occasional. Usually at OAK-HARDWOOD-FOREST edges, and in disturbed oak savanna (especially WHITE-OAK-SAVANNA).

Rhus glabra L.
Smooth Sumac
Occasional. Fencerows, roadsides, and wood edges. Usually in sandy soil.

The hybrid *Rhus* ×*pulvinata* (*R. glabra* × *R. typhina*) is rare throughout in dry situations at OAK-HARDWOOD-FOREST edges.

Rhus typhina L.
Staghorn Sumac
Common. Old fields, forest edges, oak savanna, and RR rights-of-way and roadsides. Known to hybridize with *R. glabra* forming the named hybrid *Rhus* ×*pulvinata* (see *R. glabra*).

Toxicodendron radicans (L.) Kuntze **Hanes:** *Rhus radicans*
Poison-ivy
Common. Occurs in a diversity of forested and open situations.

Toxicodendron vernix (L.) Kuntze **Hanes:** *Rhus vernix*
Poison Sumac
Common. SHRUB-CARR, FEN, BOG, RED-MAPLE-SWAMP, TAMARACK-SWAMP, SHRUB-SWAMP (associated with BOG or FEN), and BOG.

AQUIFOLIACEAE **Holly Family**

Ilex verticillata (L.) A. Gray
Michigan Holly; Winterberry; Black-alder
Occasional. FEN, TAMARACK-SWAMP, RED-MAPLE-SWAMP, WET-MEADOW, and BOG.

Nemopanthus mucronatus (L.) Loes. **Hanes:** *N. mucronata*
Mountain Holly; Winterberry; Black-alder
Occasional. BOG and SHRUB-CARR.

CELASTRACEAE **Bittersweet Family**

Celastrus orbiculata Thunb.
Oriental Bittersweet
Rare. First collected 3 August 1994 by S. P. Grund and P. J. Higman on the E side of the Augusta/Climax Rd. approximately .1 mi. S of Mott Rd. in OAK-HARDWOOD-FOREST (MICH). Probably overlooked. Not native. Not in Hanes & Hanes (1947).

Celastrus scandens L.
Climbing or American Bittersweet
Occasional. Fencerows, HARDWOOD-SWAMP, FLOODPLAIN-FOREST, SUGAR-MAPLE-FOREST, and OAK-HARDWOOD-FOREST.

Euonymus atropurpurea Jacq. **Hanes:** *E. atropurpureus*
Burning-bush; Wahoo
Very rare near the Kalamazoo River in FLOODPLAIN-FOREST and rich SUGAR-MAPLE-FOREST. Collected by the first botanical survey from along the Kalamazoo River.

Euonymus europaea L.
Spindle Tree
Rare. Recently disturbed situations, usually near old homesites. First reported outside of cultivation by Elliott (1960). Collected by P. Zager 24 May 1976 in section 30 of Kalamazoo Tp. at the NW end of Little Asylum Lake in a "low lying area." Not in Hanes & Hanes (1947).

Euonymus obovata Nutt. **Hanes:** *E. obovatus*
Running Strawberry-bush
Occasional. HARDWOOD-SWAMP, SUGAR-MAPLE-FOREST, and OAK-HARDWOOD-FOREST.

STAPHYLEACEAE **Bladdernut Family**

Staphylea trifolia L.
Bladdernut
Rare. FLOODPLAIN-FOREST, HARDWOOD-SWAMP, and SUGAR-MAPLE-FOREST.

ACERACEAE **Maple Family**

Acer pseudoplatanus L. (Sycamore Maple) is known in Kalamazoo County from a single specimen of questionable status growing near the intersection of Drake Rd. and Crosstown Pkwy. Richard W. Pippen first brought this specimen to my attention in 1996. It is not treated separately below since it seems likely to have been planted.

Acer negundo L.
Box-elder; Ash-leaved or Manitoba Maple
Occasional. Native trees are occasional throughout, mostly in FLOODPLAIN-FOREST. Widely planted and escaped from cultivation to disturbed places, usually with mucky soils.

Acer platanoides L.
Norway Maple
Rare (perhaps overlooked). Apparently spreading, especially near mature planted trees. The heavy shade it produces is a threat to native vegetation (R. Brewer pers. comm. 2001). First collected by M. McCann 1 June 1976 in section 30 of Kalamazoo Tp. near a path on the E side of Asylum Lake. Not in Hanes & Hanes (1947).

Acer rubrum L.
Red Maple
Common. A diversity of swamp and terrestrial forest and shrub communities. Readily invades native upland forests in the absence of fire. An important component of RED-MAPLE-SWAMP.

Acer saccharinum L.
Silver Maple
Common. HARDWOOD-SWAMP (usually near streams) and FLOODPLAIN-FOREST.

Acer saccharum Marsh.
Sugar or Hard Maple
Common. SUGAR-MAPLE-FOREST. Actively invades OAK-HARDWOOD-FOREST in the absence of fire. Includes the Haneses' (1947) *A. nigrum* which is recognized by Voss (1985) as *A. saccharum* ssp. *nigrum* or ssp. *viride*.

HIPPOCASTANACEAE **Buckeye Family**

Aesculus glabra Willd.
Ohio Buckeye
Very rare. A few trees can be found in the "Island" woods W of Schoolcraft. No trees in the "Island" are greater than about 25 cm diameter at chest height, and most are much smaller. A single relatively large tree of questionable status grows in a fencerow on the N side of West Michigan Avenue W of Drake Rd.

Aesculus hippocastanum L.
Horse-chestnut
Rare. An escape from cultivation rarely found far from a mature planted tree.

BALSAMINACEAE **Touch-me-not Family**

Impatiens capensis Meerb. **Hanes:** *I. biflora*
Spotted Touch-me-not
Common. Mucky situations including HARDWOOD-SWAMP, TAMARACK-SWAMP, SHRUB-CARR, SHRUB-SWAMP, and WET-MEADOW.

Impatiens pallida Nutt.
Pale Touch-me-not
Occasional. Lightly disturbed areas in SUGAR-MAPLE-FOREST, especially at edges.

RHAMNACEAE **Buckthorn Family**

Ceanothus americanus L.
New Jersey Tea
Occasional. OAK-HARDWOOD-FOREST, WHITE-OAK-SAVANNA, BLACK-OAK-BARREN, roadsides, and RR rights-of-way.

Rhamnus alnifolia L'Hér.
Alder-leaved Buckthorn
Occasional. FEN, seepage BOG, and occasionally in other swampy situations.

Rhamnus cathartica L.
Common Buckthorn
Occasional. OAK-HARDWOOD-FOREST, and dry, often clayey old fields. Can form large even-aged stands. Not native.

Rhamnus frangula L. Glossy Buckthorn
Occasional. Will colonize even relatively undisturbed wetlands with apparent ease. Especially abundant in Bishop's Bog where it forms impenetrable, even-aged thickets. Very few native plants survive in the heavy shade it produces. Locally established and spreading.

VITACEAE **Grape Family**

Parthenocissus inserta (A. Kerner) Fritsch
Occasional. Forest edges and fencerows.

Parthenocissus quinquefolia (L.) Planchon
Virginia Creeper
Common. All kinds of forest.

Vitis aestivalis Michaux
Summer Grape
Occasional. SUGAR-MAPLE-FOREST, OAK-HARDWOOD-FOREST, WET-PRAIRIE, and oak savanna.

Vitis labrusca L.
Fox Grape
Current status uncertain. Fencerows, thickets, RR rights-of-way, and dry OAK-HARDWOOD-FOREST edges. Not in Hanes & Hanes (1947).

Vitis riparia Michaux
River-bank Grape
Common. FLOODPLAIN-FOREST, HARDWOOD-SWAMP, SUGAR-MAPLE-FOREST, OAK-HARDWOOD-FOREST, and wooded roadsides.

TILIACEAE **Linden Family**

Tilia americana L.
Basswood; Linden
Occasional. FLOODPLAIN-FOREST and SUGAR-MAPLE-FOREST.

MALVACEAE **Mallow Family**

Abutilon theophrasti Medicus
Velvet-leaf
Common. Fields, roadsides, and RR rights-of-way. Widely established.

Alcea rosea L. **Hanes:** *Althaea rosea*
Hollyhock
Rare. A presumed escape from cultivation in fencerows and waste ground.

Hibiscus moscheutos L.
Rose or Swamp Mallow
Current status uncertain, very rare if still extant. First collected 15 Aug 1978 from a single large individual in an old field near Augusta. From 1998–2001 two large plants grew near the location of the first report in ballast along a RR right-of-way. These plants did not come up in 2002, and during a careful search of the surrounding area in late summer (2002) I failed to locate any plants. Probably adventive. Not in Hanes & Hanes (1947).

Hibiscus trionum L.
Flower-of-an-hour
Rare. Gardens, roadsides, and RR rights-of-way. Not native.

Malva alcea L.
Vervain Mallow
Current status unknown. Collected by the Haneses mostly from roadsides and RR rights-of-way. Not native.

Malva moschata L.
Musk Mallow
Rare. Roadsides throughout. Not native.

Malva neglecta Wallr.
Common Mallow; Cheeses
Common. Lawns and other open situations. Widely established.

GUTTIFERAE (CLUSIACEAE) (Hanes: HYPERICACEAE) **St. John's-wort Family**

Triadenum fraseri (Spach) Gl. **Hanes:** *Hypericum virginicum* var. *fraseri*
Marsh St. John's-wort
Occasional. FEN, peaty COASTAL-PLAIN-MARSH, and BOG. This "species" is scarcely discernable from the next in BOG on the W side of West Lake. I follow Voss (1985) in recognizing the two here as distinct entities.

Triadenum virginicum (L.) Raf. **Hanes:** *Hypericum virginicum*
Rare. BOG W of West Lake. Also reported by the Haneses from the shores of Weeds and Thrall Lakes (see *T. fraseri*) (Hanes & Hanes 1947).

Hypericum ascyron L.
Giant St. John's-wort
Current status uncertain. Collected by the Haneses from thinly wooded and open "marshes." Not since collected or observed.

Hypericum boreale (Britton) Bickn.
Occasional. WET-MEADOW, lakeshores, and sandy EM-MARSH.

Hypericum canadense L.
Current status unknown. Collected by the Haneses from a "marshy meadow one mi. W of Pine Island Lake," and a "marsh border" in Schoolcraft Tp.

Hypericum gentianoides (L.) BSP.
Orange-grass
Current status uncertain, very rare if still extant. Collected by the Haneses from "a marsh" near a RR right-of-way in section 7 of Brady Tp. in 1936. Associates included *Spiraea tomentosa*, "Hair-cap Moss" (*Polytrichum* sp.), and *Populus*. Collected by the Haneses from one other site in relatively dry soil near a RR right-of-way. Reported by the Haneses to be declining at the Brady Tp. site.

Hypericum majus (A. Gray) Britton
Current status unknown. Collected by the Haneses from lakeshores.

Hypericum mutilum L.
Current status unknown. Collected by the Haneses from WET-MEADOW.

Hypericum perforatum L.
Common St. John's-wort; Klamath Weed; Goatweed
Common. Disturbed situations along roadsides, RR rights-of-way, and in old fields. Widely established.

Hypericum prolificum L.
Shrubby St. John's-wort
Common. Open OAK-HARDWOOD-FOREST, and in dry-mesic to mesic disturbed BLACK-OAK-BARREN and WHITE-OAK-SAVANNA. Apparently more frequent in the NW¼ of the county than elsewhere.

Hypericum punctatum Lam.
Spotted St. John's-wort
Occasional. BOG, FEN, RED-MAPLE-SWAMP, and TAMARACK-SWAMP.

CISTACEAE **Rockrose Family**

Helianthemum bicknellii Fern.
Rockrose
Rare. Not as frequent or widespread as *H. canadense*. Known only from sandy former oak savanna and old fields in the W½ of the county. Often co-occurs with *H. canadense*.

Helianthemum canadense (L.) Michaux
Frostweed
Occasional. Sandy soil along RR rights-of-way, in old fields and oak savanna, and at open edges with OAK-HARDWOOD-FOREST.

Lechea minor L.
Thyme-leaved Pinweed
Extinct. Collected by the Haneses from sandy oak savanna along a RR right-of-way, a "moist sandy flat at the base of an oak grove near the S shore of Eagle Lake," and from along a RR right-of-way E of Schoolcraft. Last observed in 1946. All former sites are destroyed, or have been searched by the author, unsuccessfully, for several years.

Lechea pulchella Raf. **Hanes:** *L. leggettii*
Extinct. First collected by L. A. Kenoyer in 1930 from "sandy shores" at Austin Lake (Hermann 1936). Later also collected there by the Haneses. The Haneses made this note about the Austin Lake site, "It [*L. pulchella*] is fairly frequent intermittently for almost a mile along the beach in the open or in thin oak woods". Last observed in 1954 along the sandy E shore of Austin Lake. The shoreline of Austin Lake has been heavily developed since 1954.

Lechea stricta Britton
Current status uncertain, very rare if still extant. A sterile specimen collected from dry soil along a RR right-of-way E of Schoolcraft by W. B. Drew et al. (M126 MSC) in 1947 is referred here by Voss (1985). Similar to *L. intermedia* which is not known from Kalamazoo County. Not in Hanes & Hanes (1947).

Lechea villosa Ell.
Hairy Pinweed
Occasional. Dry sandy soil along RR rights-of-way, and roadsides, and in BLACK-OAK-BARREN and sandy WHITE-OAK-SAVANNA, primarily in the W½ of the county.

VIOLACEAE **Violet Family**

This is a large and diverse family in Kalamazoo County. I have relied heavily on annotations to herbarium specimens made by E. G. Voss, and H. E. Ballard to identify our many species. Several of the below named hybrids are reported solely based upon their inclusion in Ballard (1994).

Hybanthus concolor (T. F. Forster) Sprengel
Green Violet
Current status uncertain, very rare if still extant. Reported by the Haneses from N of the Kalamazoo River and extending along it to the E on elevated "islands" (levees) of moist forest (SUGAR-MAPLE-FOREST) in a matrix of mature FLOODPLAIN-FOREST. Reported by H. E. Ballard (ca. 1983) to persist in a few places on the aforementioned levees (H. E. Ballard pers. comm. 2002).

Viola affinis Le Conte
Occasional. FEN, WET-MEADOW, open RED-MAPLE-SWAMP, and other swampy situations near lakes and streams.

Viola arvensis Murray
Field Pansy
Occasional. Fields, RR rights-of-way, and roadsides. Not native.

Viola blanda Willd. **Hanes:** *V. incognita*
Sweet White Violet
Occasional. Wet depressions in TAMARACK-SWAMP, RED-MAPLE-SWAMP, BOG, and FEN.

Viola canadensis L.
Canada Violet
Common. SUGAR-MAPLE-FOREST.

Viola conspersa Reichb. Hanes: *V. labradorica*
Dog Violet
Occasional. SUGAR-MAPLE-FOREST and OAK-HARDWOOD-FOREST.

The named hybrid *Viola* ×*malteana* (*V. conspersa* × *V. rostrata*) is rare throughout in ecotone between OAK-HARDWOOD-FOREST and wetlands, where the putative parents grow near one another (Ballard 1994).

Viola cucullata Aiton
Marsh Violet
Common. FEN, open and lightly wooded WET-MEADOW, SHRUB-SWAMP (usually associated with BOG moats), and SHRUB-CARR.

Viola lanceolata L.
Lance-leaved Violet
Occasional. COASTAL-PLAIN-MARSH, sandy WET-PRAIRIE, WET-MEADOW, and BOG. Hybridizes with *V. sagittata* in sandy WET-PRAIRIE/COASTAL-PLAIN-MARSH in Alamo Tp.

Viola macloskeyi F. E. Lloyd **Hanes:** *V. pallens*
Smooth White Violet
Occasional. FEN, BOG, and SHRUB-CARR.

Viola nephrophylla Greene
Occasional. FEN, seepage BOG, SHRUB-CARR, and marly lakeshores.

Viola odorata L.
English or Sweet Violet
Common. Lawns, gardens, suburban woods, and cemetaries. Hybridizes with several of our native violets. Not native.

Viola palmata L. **Hanes:** *V. triloba*
Wood Violet
Rare. Damp sandy depressions in OAK-HARDWOOD-FOREST and oak savanna, including sandy WET-PRAIRIE. Ballard (1994) suggests that some, if not all plants, may be of hybrid origin. The parentage may involve *V. sagittata* and *V. lanceolata*, but several entities including hybrids involving *V. pedatifida* are probably lumped under this name (Ballard 1994; Voss 1985).

Viola pedata L.
Birdfoot Violet
Rare. Relatively intact and open BLACK-OAK-BARREN and sandy former WHITE-OAK-SAVANNA, primarily in the W½ of the county. Declining due to habitat loss. Seems to thrive at sites where the substrate is subject to occasional minor disturbance, such as along lightly used trails.

Viola pedatifida G. Don
Prairie Violet
Very rare. RR rights-of-way and roadsides through former TERRESTRIAL-PRAIRIE. Collected along RR rights-of-way in Schoolcraft (where it still persists) as early as 6 June 1902. I observed a plant with cleistagomous flowers typical of *V. pedatifida*, but with entire leaves, growing near typical *V. pedatifida* along the GTRR right-of-way south of XY Avenue in 1997. It may be a hydrid. Prairie violet is not known in Kalamazoo County from outside the boundaries of former TERRES-

TRIAL-PRAIRIE (known from Gull Prairie, Prairie Ronde, and Gourdneck Prairie). I am not even aware of sites from within BUR-OAK-SAVANNA bordering former TERRESTRIAL-PRAIRIE. Prairie Violet has declined markedly in Kalamazoo County in recent years due to lack of management of the few remaining prairie remnants, and inadequate protection (loss of fencerows, widening of roads, and disturbance to TERRESTRIAL-PRAIRIE RR rights-of-way and cemeteries through bulldozing, narrowing, herbicide application, etc.).

The hybrid *Viola* ×*subsinuata* (*V. pedatifida* × *V. sororia*) is rare in Harrison Cemetery in Prairie Ronde Tp. growing amidst its putative parents.

Viola pubescens Aiton
Yellow Violet
There are two widely recognized varieties: var. *pubescens* (Downy Yellow Violet) and var. *scabriuscula* (Smooth Yellow Violet). Both are common throughout in OAK-HARDWOOD-FOREST, SUGAR-MAPLE-FOREST and FLOODPLAIN-FOREST. The two vars. sometimes occur in the same forest, suggesting they may best be treated as two species. Includes the Haneses' (1947) *V. pensylvanica*.

Viola rostrata Pursh
Long-spurred Violet
Occasional. OAK-HARDWOOD-FOREST and relatively dry situations in SUGAR-MAPLE-FOREST.

The hybrid *Viola* ×*brauniae* (*V. rostrata* × *V. striata*) is rare throughout in ecotone at the edge of HARDWOOD-SWAMP and FLOODPLAIN-FOREST (Ballard 1994). Also known to hybridize with *V. conspersa* forming the named hybrid *Viola* ×*malteana* (see *V. conspersa*).

Viola sagittata Aiton
Arrow-leaved Violet
Occasional. BLACK-OAK-BARREN, OAK-HARDWOOD-FOREST, and moist to wet sand along roadsides, in old fields, and in other sandy, moist, and relatively open situations. White flowered plants are relatively common. All known specimens are of the var. *sagittata.*

Viola sororia Willd.
Common Blue Violet
Occasional. SUGAR-MAPLE-FOREST and OAK-HARDWOOD-FOREST. Less frequent in swamp forests. Includes the Haneses'(1947) *V. papilionacea*.

Viola striata Aiton
Cream Violet
Occasional. FLOODPLAIN-FOREST. Especially common along trails. Known to hybridize with *V. rostrata* forming the named hybrid *Viola* ×*brauniae* (see *V. rostrata*).

Viola tricolor L.
Johnny-jump-up
Locally established. Roadsides. Especially common (1996) in disturbed ground above the steam pipes on the WMU campus. Not native. Not in Hanes & Hanes (1947).

CACTACEAE **Cactus Family**

Opuntia humifusa (Raf.) Raf.
Prickly Pear Cactus
Current status uncertain, very rare if still extant. Collected by the Haneses from section 24 of Cooper Tp. in sandy soil (former oak savanna). I have been unable to relocate plants in this area, but much potential habitat remains unsearched. A few individuals grow in a BLACK-OAK-BARREN reconstruction S of the commuter lot at the intersection of Centre St. and US 131 in Portage. The origin of these plants is unknown.

THYMELAEACEAE **Mezereum Family**

Dirca palustris L.
Leatherwood
Occasional. Rich, moist SUGAR-MAPLE-FOREST and ASH-SWAMP.

ELAEAGNACEAE **Oleaster Family**

Elaeagnus angustifolia L.
Russian-olive
Occasional. A diversity of moist open situations, especially roadsides. Widely established.

Elaeagnus umbellata Thunb.
Occasional. Old fields and other disturbed situations. Widely established.

LYTHRACEAE **Loosestrife Family**

Decodon verticillatus (L.) Ell.
Whorled or Swamp Loosestrife
Common. On the margin of lakes, streams, and rivers in BOG, EM-MARSH, and FEN.

Lythrum alatum Pursh
Winged Lythrum
Current status uncertain. Known primarily from the S½ of the county in EM-MARSH.

Lythrum salicaria L.
Purple Loosestrife
Common. WET-MEADOW, SHRUB-SWAMP, EM-MARSH, COASTAL-PLAIN-MARSH, in ditches, and in almost all other relatively open, wet situations. First reported by Elliott (1960) from along Augusta Creek in Ross Tp. and from the SW shore of Mud (Stony) Lake. Not in Hanes & Hanes (1947). Widely established and spreading, especially where once dynamic water levels have been stabilized or otherwise manipulated (such as in most of the formerly species rich COASTAL-PLAIN-MARSHES at Eagle Lake (pers. obs.)).

Rotala ramosior (L.) Koehne
Tooth-cup
Rare. Collected by the Haneses from EM-MARSH of ponds and lakeshores where the substrate is sand or peaty sand and where water levels fluctuate seasonally. Sometimes in COASTAL-PLAIN-MARSH. Mostly limited to the W½ of the county. The Haneses observed that plants were much more common after fire. Now absent from several former sites, and rare and local elsewhere. Perhaps declining at least in part due to fire suppression and stabilization of once dynamic water levels.

NYSSACEAE Hanes: Included in CORNACEAE **Tupelo Family**

Nyssa sylvatica Marsh.
Sour-gum; Black-gum; Pepperidge
Occasional. Peaty and/or sandy acid substrates in HARDWOOD-SWAMP and lightly wooded OAK-HARDWOOD-FOREST, usually near current or former lakeshores.

MELASTOMATACEAE **Melastome Family**

Rhexia virginica L.
Meadow-beauty
Current status uncertain, very rare if still extant. Collected by the Haneses from Eagle Lake and Pine Island Lake. May be extinct at Eagle Lake (well surveyed in 1996–1997 and sporadically since). Status at Pine Island Lake is uncertain.

ONAGRACEAE **Evening-primrose Family**

Several species of *Oenothera* are reported here based only on annotations made by E. G. Voss and/or because they are mapped in his treatment of this genus for Volume III of Michigan Flora (1996).

Circaea alpina L.
Enchanter's-nightshade
Current status uncertain. RED-MAPLE-SWAMP. Particularly common in the vicinity of the Sugarloaf Lakes. Included in the Haneses' (1947) *C. quadrisulcata*.

Circaea lutetiana L.
Enchanter's-nightshade
Occasional. FLOODPLAIN-FOREST, SUGAR-MAPLE-FOREST, and OAK-HARDWOOD-FOREST. Often especially abundant in young second growth forests near wetlands. Not in Hanes & Hanes (1947). Included in the Haneses' (1947) *C. quadrisulcata.*

Epilobium angustifolium L.
Fireweed; Great Willow-herb
Only occasionally encountered as a local element of relatively acidic disturbed wetlands. Once "common" in Bishop's Bog, but now only occasionally encountered there (Hanes & Hanes 1947). Reported by the Haneses to thrive after burning in WET-MEADOW and other wetlands.

Epilobium ciliatum Raf. **Hanes:** *E. adenocaulon*
Northern Willowherb
Collected by the Haneses from the "sandy shore of Pretty Lake," and a "swamp in Section 14 Charleston Tp."

Epilobium coloratum Biehler
Purple-leaved Willowherb
Current status uncertain. Known from a diversity of wetland ecotones.

Epilobium hirsutum L.
Great Hairy Willow-herb
Rare. First Michigan collection was made by H. R. Becker "1.5 mi. NE of Portage" in 1943 (Hanes 1945b). Occurs in WET-MEADOW, along lakeshores and roadsides, and in wet, old fields.

Epilobium leptophyllum Raf.
Linear-leaved Willow-herb
Collected by the Haneses from the BOG east of Sugarloaf Lake, and from a streamside. The only relatively recent report that I am aware of is from a "marsh" at the Nature Conservancy Augusta Floodplain Forest Preserve (Meagher & Tonsor 1992).

Epilobium strictum Sprengel
Downy Willow-herb
Current status uncertain. FEN.

Gaura biennis L.
Very rare. Disturbed former TERRESTRIAL-PRAIRIE/BUR-OAK-SAVANNA. The only extant plants I have seen in Kalamazoo County grow on the N side of the current RR right-of-way through the WMU campus (1996), not far from the intersection of Stadium Dr. and Oliver St., and very near if not within the right-of-way of the former MI Central RR. The plants are associated with *Ratibida pinnata*, *Silphium integrifolium* and weedy exotics in mesic loam. Most of the plants were destroyed by herbicide spraying and clearing in 1997. Not in Hanes & Hanes (1947), but added to the margin of their personal annotated copy.

Gaura coccinea Pursh
Collected for the first time in the county by the Haneses in 1953. Not in Hanes & Hanes (1947), but added to the margin of their personal annotated copy. Collected by the author from a RR right-of-way W of Schoolcraft in 1996 where a few months later it was killed by herbicide (not seen again since). Probably adventive.

Ludwigia alternifolia L.
Seedbox
Current status uncertain, very rare if still extant. Collected by the Haneses from a "swamp NE of Vicksburg in Section 7 Brady Tp."

Ludwigia palustris (L.) Ell.
Water-purslane
Occasional. EM-MARSH and depressions associated with FEN, BOG, and WET-MEADOW.

Ludwigia polycarpa Short & Peter
Current status unknown. EM-MARSH of ditches, the edges of lakes, and in ponds.

Oenothera clelandii Dietrich, Raven, & W. L. Wagner **Hanes:** *O. rhombipetala*
Rhombic Evening Primrose
Occasional. Disturbed, sandy former BLACK-OAK-BARREN, especially near Pretty, Eagle, and Crooked Lakes in Texas Tp. Known only from the west half of Kalamazoo County.

Oenothera fruticosa L. **Hanes:** *O. tetragona*.
Sundrops
Current status unknown. Collected by the Haneses from a diversity of mostly disturbed situations.

Oenothera laciniata Hill
Cut-leaved Evening Primrose
Occasional in a diversity of sandy situations including former BLACK-OAK-BARREN.

Oenothera parviflora L. **Hanes:** *O. cymatilis* (in part)
Evening Primrose
Current status unknown. Collected by the Haneses from old fields, roadsides, and RR rights-of-way. Not in Hanes & Hanes (1947).

Oenothera villosa Thunb. **Hanes:** *O. biennis, O. canovirens, O. cymatilis* (in part)*, O. muricata,* & *O. pycnocarpa*
Current status unknown. Collected by the Haneses from old fields, roadsides and RR rights-of-way, and from a sandy lake border. Not in Hanes & Hanes (1947).

HALORAGACEAE **Water-milfoil Family**

Myriophyllum exalbescens Fern.
Spiked Water-milfoil
Occasional. SUB-MARSH of lakes and streams.

Myriophyllum heterophyllum Michaux
Various-leaved Water-milfoil
Occasional. SUB-MARSH of lakes.

Myriophyllum tenellum Bigelow
Slender Water-milfoil
Collected by the Haneses from SUB-MARSH at Eagle and Pretty Lakes. Now occasional at Pretty and Crooked Lakes, and probably also in Eagle Lake, in SUB-MARSH. The aforementioned oligotrophic lakes have sandy bottoms. The plants I have seen in Crooked and Pretty Lakes were growing in less than 50 cm of water, and could be easily observed during the low water levels of the fall of 1999. This species is here at the S edge of its known range.

Myriophyllum verticillatum L.
Whorled Water-milfoil
The Haneses note that this species is "rare in most of our ponds and lakes." Still widely distributed, and though probably not common, it is easily overlooked.

Proserpinaca palustris L.
Mermaid-weed
Occasional on lake borders, especially EM-MARSH bordering ponds with fluctuating water levels, and usually associated with peaty/sandy substrates.

HIPPURIDACEAE **Mare's-tail Family**

Hippuris vulgaris L.
Mare's-tail
Extinct. Collected by the first botanical survey in 1838 (MICH). Not since known from S Lower Michigan.

ARALIACEAE **Ginseng Family**

Aralia elata (Miq.) Seem. has been collected several times from near the intersection of B Ave. and 45th St. in Kalamazoo, where it was probably once cultivated. It was last collected at this site on 27 July 1977. The Hanes do not report this species in their flora. Since the status of these collections is uncertain, and since the label data are inconclusive on this matter, I have not included *Aralia elata* in the checklist below.

Aralia hispida Vent.
Bristly Sasparilla
Rare. BOG and associated TAMARACK-SWAMP.

Aralia nudicaulis L.
Wild Sasparilla
Occasional. OAK-HARDWOOD-FOREST, SUGAR-MAPLE-FOREST, and RED-MAPLE-SWAMP.

Aralia racemosa L.
Spikenard
Occasional. Rich HARDWOOD-SWAMP, RED-MAPLE-SWAMP, and SUGAR-MAPLE-FOREST.

Panax quinquefolius L.
Ginseng; Sang
Rare. Rich HARDWOOD-SWAMP, RED-MAPLE-SWAMP, and SUGAR-MAPLE-FOREST. Planted in "Holcomb's Woods," SW of Fulton (K. Chapman, MNFI Site survey report 1980).

Panax trifolius L. **Hanes:** *P. trifolium*
Dwarf Ginseng
Occasional. SUGAR-MAPLE-FOREST.

UMBELLIFERAE (APIACEAE) **Carrot or Parsley Family**

Aegopodium podagraria L.
Goutweed
Current status unknown. Collected by the Haneses from the H. R. Becker yard in Charleston Tp. Not native.

Anethum graveolens L.
Dill
Current status unknown. Collected by the Haneses from a "roadside near the H. R. Becker farm in Charleston Tp." Not native.

Angelica atropurpurea L.
Purple-stemmed Angelica
Occasional. WET-PRAIRIE, WET-MEADOW, and FEN. Usually associated with *Spartina pectinata*.

Angelica venenosa (Greenway) Fern.
Hairy Angelica
Very rare. Collected by the Haneses from overgrown WHITE-OAK-SAVANNA and from thin OAK-HARDWOOD-FOREST (former WHITE-OAK-SAVANNA). Now restricted to a single site, NW of the intersection of Drake Rd. and US 131 in WHITE-OAK-SAVANNA. Here it is abundant (hundreds of stems) and associated with other rare and interesting oak savanna plants. This site lies in or near the edge of the former right-of-way of the Michigan Central RR.

Anthriscus sylvestris (L.) Hoffm.
Chervil
Current status unknown. Known outside of cultivation in Michigan only from Kalamazoo County. Collected from roadsides and disturbed OAK-HARDWOOD-FOREST. First collected 30 May 1953 by G. Parmelee in section 6 of Ross Tp. "N of road past the MSC Bio Station entrance . . . on low ground adjacent to water-lily pond" (MSC). Not native. Not in Hanes & Hanes (1947).

Berula erecta (Hudson) Cov. **Hanes:** *B. pusilla*
Cut-leaved Water Parsnip
Rare. Especially in rich sediment along streams through FEN meadow. Flowering usually occurs from late June into August. Especially common in the vicinity of the Sugarloaf Lakes and Hampton Creek (both in the Gourdneck State Game Area).

Carum carvi L.
Caraway
Current status unknown. Collected by the Haneses on 13 June 1945 from a roadside in section 26 of Wakeshma Tp. Not native.

Chaerophyllum procumbens (L.) Crantz
Wild-chervil
Very rare. Known only from FLOODPLAIN-FOREST near the Kalamazoo River where it is rare in moist depressions.

Cicuta bulbifera L.
Bulblet Water Hemlock
Occasional. Wet depressions, especially alongside lakes and streams.

Cicuta maculata L.
Water Hemlock
Occasional. WET-PRAIRIE, open RED-MAPLE-SWAMP, FEN, open swamp forest, wet ditches, and quite generally almost anywhere in wet depressions.

Conioselinum chinense (L.) B.S.P.
Hemlock-parsley
Rare. Usually growing singly in TAMARACK-SWAMP and RED-MAPLE-SWAMP.

Conium maculatum L.
Poison-hemlock
Occasional. Roadsides, RR rights-of-way, and other disturbed situations.

Cryptotaenia canadensis (L.) DC.
Honewort
Current status uncertain. SUGAR-MAPLE-FOREST, especially following disturbance (R. Brewer pers. comm. 2001).

Daucus carota L.
Wild Carrot; Queen-Anne's-lace
Common. Most relatively open disturbed situations, especially old fields. Widely established.

Erigenia bulbosa (Michaux) Nutt.
Harbinger-of-spring
Common. SUGAR-MAPLE-FOREST and OAK-HARDWOOD-FOREST.

Eryngium yuccifolium Michaux
Rattlesnake-master
Very rare. Collected by the Haneses and others from WET-PRAIRIE, TERRESTRIAL-PRAIRIE, BUR-OAK-SAVANNA, and wet to wet-mesic depressions in BLACK-OAK-BARREN and WHITE-OAK-SAVANNA. Most records are from ecotone at wetland edges with prairie or oak savanna, but this may just represent the distribution of less-disturbed, relatively open sites where specimens persisted. Most substrates were loamy sand or sandy loam. Probably once modal in wet-mesic and WET-PRAIRIE. Of the 10 or more distinct populations known by the Haneses (some very large), only one small population remains. At least half of the aforementioned populations were still extant as recently as 1980. Most former sites have since succeeded to forest/shrubs and a few have been destroyed by changes in land use. In 1997 11 stems, only one of which flowered, could be found at the one remaining site. In 2002, one stem again flowered, but only six stems were observed in the area. The site had been partly overgrown by shrubs. This population has probably persisted in part because past visitors to the site (over the last 30+ years) have removed portions of woody debris that shaded the plants (R. W. Pippen pers. comm.; pers. obs.). I have done this several times myself over the last nine years. There appears to be a correlation between removal of the shade-producing woody debris and flowering in this population (R. W. Pippen pers. comm. 1996, pers. obs.). This site is in a sandy Consumers Power right-of-way (est. 1954) at the interface between overgrown oak savanna (now open OAK-HARDWOOD-FOREST) and FEN/SHRUB-CARR in the Gourdneck State Game Area (Sytsma & Pippen 1982a). Overuse by recreators, and especially herbicide application may have contributed to the relatively recent deterioration of this once very species rich site (pers. obs., R.W. Pippen pers. comm.). Perhaps the largest known population post Hanes (1947) occurred in WET-PRAIRIE along the right-of-way of the former MI Central RR along Arcadia Creek near the WMU campus. Much of this site is now under the current Stadium Drive (completed between 1962–1964). Unfortunately, shrub and tree growth shaded out the few plants that persisted after the aforementioned "improvement" of Stadium Drive (Brewer 1965, R. Brewer pers. comm.). No plants remain in the area, but timely management may permit the recovery of at least a few plants from the seed bank.

Foeniculum vulgare Miller
Fennel
Collected only by the Haneses in 1952 and 1953 from along the GTRR near Schoolcraft. Not in Hanes & Hanes (1947). Not native.

Heracleum maximum Bartram **Hanes:** *H. lanatum*
Cow-parsnip
Occasional. RED-MAPLE-SWAMP, FEN, and along streams, in a variety of lightly shaded to open wet situations.

Hydrocotyle americana L.
American Pennywort
Occasional. Shady wet situations, usually not far from open or running water.

Hydrocotyle umbellata L.
Umbellate Pennywort
Occasional. Usually found near the shores of sandy-bottomed streams and lakes including COASTAL-PLAIN-MARSH. Especially frequent in the SW¼ of the county.

Osmorhiza claytonii (Michaux) C. B. Clarke
Wooly Sweet Cicely
Common. SUGAR-MAPLE-FOREST and OAK-HARDWOOD-FOREST.

Osmorhiza longistylis (Torrey) DC.
Smooth Sweet Cicely
Occasional. Rich, often relatively wet SUGAR-MAPLE-FOREST.

Oxypolis rigidior (L.) Raf.
Cowbane
Occasional. FEN, WET-MEADOW, and openings in RED-MAPLE-SWAMP. Usually near lakes or streams.

Pastinaca sativa L.
Wild Parsnip
Rarely escaped from cultivation along roadsides in disturbed loamy soils.

Sanicula canadensis L.
Short-styled Snakeroot
Occasional? HARDWOOD-SWAMP and relatively wet SUGAR-MAPLE-FOREST.

Sanicula gregaria Bickn.
Clustered Snakeroot
Occasional. A diversity of habitats including SUGAR-MAPLE-FOREST, OAK-HARDWOOD-FOREST, RED-MAPLE-SWAMP, and FEN.

Sanicula marilandica L.
Black Snakeroot
Occasional. Rich HARDWOOD-SWAMP, SUGAR-MAPLE-FOREST, and OAK-HARDWOOD-FOREST.

Sanicula trifoliata Bickn.
Large-fruited Snakeroot
Current status uncertain. SUGAR-MAPLE-FOREST.

Sium suave Walter
Water-parsnip
Occasional. Usually near lakes and streams in HARDWOOD-SWAMP, RED-MAPLE-SWAMP, and TAMARACK-SWAMP.

Taenidia integerrima (L.) Drude
Yellow-pimpernel
Occasional. SUGAR-MAPLE-FOREST, OAK-HARDWOOD-FOREST, and especially overgrown former sandy oak savanna.

Thaspium trifoliatum (L.) A. Gray
Meadow Parsnip
Extinct. Collected by the Haneses from WHITE-OAK-SAVANNA (growing very close to former terrestrial prairie) and TERRESTRIAL-PRAIRIE.

Zizia aurea (L.) Koch
Golden Alexanders
Occasional. FEN, WET-MEADOW, WET-PRAIRIE, and TERRESTRIAL-PRAIRIE. Collected by the Haneses from banks along a RR right-of-way through Prairie Ronde. Probably once also occurred in wet to wet-mesic oak savanna.

CORNACEAE **Dogwood Family**

Cornus alternifolia L. f.
Alternate-leaved or Pagoda Dogwood
Rare to Occasional. Stream borders in thickets, often at the shady interface between OAK-HARDWOOD-FOREST and FEN.

Cornus amomum Miller **Hanes:** *C. obliqua*
Pale Dogwood
Common. BOG, WET-MEADOW, FEN, SHRUB-SWAMP, SHRUB-CARR, WET-PRAIRIE, and TAMARACK-SWAMP, often at the margin of lakes, streams, and rivers.

Cornus canadensis L.
Bunchberry; Dwarf Cornel
Current status uncertain. Collected by the Haneses from four distinct sites in the county; " . . . damp woods N of Sugarloaf Lake, . . . Shaffer's oak woods NE of Goose Lake, . . . a low woodland along Flowerfield Creek in section 20 of Prairie Ronde Tp., and . . . Alamo Tp." I have been unable to relocate plants at Sugarloaf Lake and Goose Lake. I have not searched for plants at the other sites.

Cornus florida L.
Flowering Dogwood
Occasional. Rich hilly SUGAR-MAPLE-FOREST and OAK-HARDWOOD-FOREST. Usually found in areas where the forest canopy is relatively open such as on hillsides overlooking lakes, streams, and other wetlands (including hillside prairie).

Cornus foemina Miller **Hanes:** *C. racemosa*
Gray Dogwood
Common. Droughty former oak savanna, OAK-HARDWOOD-FOREST, old fields, and other disturbed situations.

Cornus rugosa Lam.
Round-leaved Dogwood
Collected by the Haneses from "a bank on the S shore of Pretty Lake," and near a roadside on the SE shore of Stony Lake. Still extant (1999) at Pretty Lake on a steep hillside (hillside prairie) between the lakeshore and open OAK-HARDWOOD-FOREST. Status at Stony Lake is unknown.

Cornus stolonifera Michaux
Red-osier
Common. SHRUB-CARR, FEN, SHRUB-SWAMP, BOG, and WET-MEADOW.

PYROLACEAE (Hanes: ERICACEAE) **Shinleaf or Wintergreen Family**

Chimaphila maculata (L.) Pursh
Spotted Wintergreen
Once relatively rare, but now occasional throughout. Sandy soils of relatively open, disturbed OAK-HARDWOOD-FOREST and shrubby former BLACK-OAK-BARREN. The reason this species has increased significantly in frequency and abundance in recent years is unknown, but may be related to fire suppression.

Chimaphila umbellata (L.) W. P. C. Barton
Pipsissewa; Prince's-pine
Occasional. Rich OAK-HARDWOOD-FOREST, usually near wetlands. Less common than *C. maculata*.

Orthilia secunda (L.) House **Hanes:** *Pyrola secunda*
One-sided Shinleaf
Current status uncertain, very rare if still extant. Known from a collection at the Kalamazoo Valley Museum made by A. C. Roberts 3.5 mi. SW of Kalamazoo on 25 June 1899 (KVM), and from a collection made by the Haneses in "an oak wood on the dry bank of a cat hole in section 32 of Texas Tp." (Hanes 1950). Not since collected or observed.

Pyrola asarifolia Michaux
Liver-leaved Wintergreen
Collected by the Haneses from TAMARACK-SWAMP "N of Sugarloaf Lake" and "in the swamp N of Mud Lake, Pavilion Tp." No longer known at Sugarloaf Lake. Status at Mud Lake is uncertain.

Pyrola elliptica Nutt.
Shinleaf
Occasional. Typically in moist depressions at the interface between sandy OAK-HARDWOOD-FOREST and wetlands. In similar situations as the next species, but less frequently encountered.

Pyrola rotundifolia L.
Round-leaved Wintergreen
Occasional. Depressions in sandy OAK-HARDWOOD-FOREST, usually near wetlands.

MONOTROPACEAE (Hanes: Included in ERICACEAE) **Indian-pipe Family**

Monotropa hypopithys L.
Pinesap; False Beech-drops
Current status uncertain. OAK-HARDWOOD-FOREST.

Monotropa uniflora L.
Indian-pipe
Occasional. OAK-HARDWOOD-FOREST and SUGAR-MAPLE-FOREST.

ERICACEAE **Heath Family**

Andromeda glaucophylla Link
Bog-rosemary
Occasional. BOG.

Arctostaphylos uva-ursi (L.) Sprengel
Bearberry; Kinnikinick
Extinct. Collected by the Haneses from "open dunes" (probably sandy BLACK-OAK-BARREN) on the E side of Austin Lake. This site has been intensively developed. No other populations have ever been known.

Chamaedaphne calyculata (L.) Moench
Leatherleaf
Common. BOG.

Epigaea repens L.
Trailing-arbutus
Current status uncertain, very rare if still extant. Dry hillside OAK-HARDWOOD-FOREST in the W½ of the county near wetlands. Last observed by H. E. Ballard in the early 1980s (H. E. Ballard pers. comm. 2002).

Gaultheria hispidula (L.) Bigelow **Hanes:** *Chiogenes hispidula*
Creeping-snowberry
Current status uncertain, very rare if still extant. The Haneses (1947) report this species was "rare" in the "swamp" E of Sugarloaf Lake. They say that they had collected "berries," but at a later date were unable to relocate the plants to secure a specimen for the herbarium. This site may now be flooded.

Gaultheria procumbens L.
Teaberry; Wintergreen
Occasional. Sandy OAK-HARDWOOD-FOREST.

Gaylussacia baccata (Wangenh.) K. Koch
Huckleberry; Crackleberry
Occasional. OAK-HARDWOOD-FOREST, BOG, and TAMARACK-SWAMP, on sandy peat, or on shallow peat with underlying sand. Appears to be about equally as frequent in dryer situations as in swampy ones.

Vaccinium angustifolium Aiton **Hanes:** *V. lamarckii* & *V. brittonii*
Low Sweet Blueberry
Collected by the Haneses from an "oak wood NE of Goose Lake," and "oak woods" in Texas Tp. Now also known from Hampton Lake where it grows in rich TAMARACK-SWAMP with *C. acaule*. Probably overlooked. The forma *nigrum* (*V. brittonii* in Hanes & Hanes (1947)) was reported by the Haneses to grow with the typical forma NE of Goose Lake on a sandy rise of ground with oaks. This form is more common than would appear from the few collections in herbaria.

Vaccinium corymbosum L.
Highbush Blueberry
Common. BOG, TAMARACK-SWAMP, SHRUB-CARR, and relatively open situations in RED-MAPLE-SWAMP.

Vaccinium macrocarpon Aiton **Hanes:** *Oxycoccus macrocarpus*
Large Cranberry
Common. BOG.

Vaccinium myrtilloides Michaux
Velvetleaf or Canada Blueberry
Occasional. OAK-HARDWOOD-FOREST, especially near wetlands.

Vaccinium oxycoccus L. **Hanes:** *Oxycoccus palustris*
Small Cranberry
Common. BOG. Especially abundant in open *Sphagnum* in the wet "sedge mat."

Vaccinium pallidum Aiton **Hanes:** *V. vacillans*
Low Sweet Blueberry
Occasional. Dry, sandy situations in open OAK-HARDWOOD-FOREST, especially at edges.

PRIMULACEAE **Primrose Family**

***Anagallis arvensis* L.**
Common or Scarlet Pimpernel
Current status unknown. Gardens, roadsides, and other disturbed situations.

Lysimachia ciliata L.
Fringed Loosestrife
Occasional. Wet depressions, lakeshores, and at the margins of streams, growing in EM-MARSH, FEN, BOG, and WET-MEADOW.

Lysimachia lanceolata Walter
Lance-leaved Loosestrife
Occasional in a diversity of lakeshore wetlands.

Lysimachia nummularia L.
Moneywort
Occasional. A diversity of moist to wet disturbed situations. Sometimes exceedingly abundant in lawns and along lakeshores. Readily invades COASTAL-PLAIN-MARSH, WET-MEADOW, and swampy forest edges. Not native.

Lysimachia quadriflora Sims **Hanes:** *L. longifolia*
Narrow-leaved Loosestrife
Occasional. FEN and WET-MEADOW along alkaline shorelines. Sometimes locally abundant in light shade under open-grown tamarack.

Lysimachia quadrifolia L.
Whorled Loosestrife
Occasional. Sandy overgrown oak savanna and OAK-HARDWOOD-FOREST, especially in the vicinity of the Hampton Creek Wetlands Complex. Does not appear to persist long after canopy closure; thus, it is a good indicator of quality (perhaps recoverable) former oak savanna (now OAK-HARDWOOD-FOREST).

The fertile hybrid *Lysimachia* ×*producta* ×*L. quadrifolia* (*L. terrestris*) was collected by the Haneses from a peaty TAMARACK-SWAMP NE of Goose Lake. Current status unknown.

Lysimachia terrestris (L.) BSP. **Hanes:** *L. producta*
Swamp-candles
Very rare. Collected by the Hanes from a "tamarack swamp" NE of Goose Lake "where it is scarce."

A collection was made by A. C. Roberts in 1900 (KVM), and this species is reported by Meagher and Tonsor (1992) from "marsh" at the Augusta Floodplain Forest Preserve. No other collections are known from Kalamazoo County. A hybrid with *L. quadrifolia* (*Lysimachia ×producta* (see *L. quadrifolia*)) is known from Kalamazoo County.

Lysimachia thyrsiflora L.
Tufted Loosestrife
Occasional. WET-MEADOW, FEN, EM-MARSH, and SHRUB-CARR.

Trientalis borealis Raf.
Star-flower
Occasional. TAMARACK-SWAMP, ASH-SWAMP, BOG, and RED-MAPLE-SWAMP.

OLEACEAE **Olive Family**

Fraxinus americana L.
White Ash
Occasional. OAK-HARDWOOD-FOREST and SUGAR-MAPLE-FOREST.

Fraxinus nigra Marshall
Black Ash
Common. Most kinds of swamp forest, but especially ASH-SWAMP and RED-MAPLE-SWAMP.

Fraxinus pennsylvanica Marshall
Red or Green Ash
Occasional. HARDWOOD-SWAMP and FLOODPLAIN-FOREST.

Fraxinus quadrangulata Michaux
Blue Ash
Rare. Rich, relatively wet SUGAR-MAPLE-FOREST and HARDWOOD-SWAMP. Often associated with *Asimina triloba* and *Celtis occidentalis*.

Ligustrum vulgare L.
Common Privet
Collected by the Haneses from a "thicket on the N shore of Woods Lake, Kalamazoo Tp." Plants are occasionally encountered throughout Kalamazoo County, usually in disturbed shrubby situations. Not native.

Syringa vulgaris L.
Common Lilac
Occasional outside of cultivation in a diversity of disturbed habitats including forest edges and old fields. Locally established.

GENTIANACEAE **Gentian Family**

Bartonia virginica (L.) B.S.P.
Yellow Bartonia
Rare. Acid swampy situations including BOG, RED-MAPLE-SWAMP, and TAMARACK-SWAMP, growing in peaty sand or *Sphagnum*.

Frasera caroliniensis Walter **Hanes:** *Swertia carolinensis*
American Columbo
Collected by the Haneses from overgrown WHITE-OAK-SAVANNA, and formerly open OAK-HARDWOOD-FOREST. Now occasional throughout at the edges of overgrown dry-mesic to mesic savannas that have succeeded to closed-canopy OAK-HARDWOOD-FOREST (primarily WHITE-OAK-SAVANNA, especially on outwash near TERRESTRIAL-PRAIRIE). A long-lived monocarpic perennial. Plants may persist as a rosette of leaves in a vegetative state for more than 30 years in S Carolina, and doubtless here too. Probably once modal in mesic and species rich WHITE-OAK-SAVANNA and adjacent prairie. Frequently associated with *Arnoglossum atriplicifolium* which, like

this species, has declined significantly since publication of the Haneses' 1947 flora (Hanes & Hanes 1947; Threadgill et al. 1979; Threadgill et al. 1981).

Gentiana alba Nutt. **Hanes:** *G. flavida*
White Gentian
Extinct. Reported by the Haneses from "two mi. S of Portage in dry oak woods" (woods along the "Smith huckleberry marsh" at Weeds Lake in section 32 of Portage Tp., a former oak savanna), and from "the border of a cat hole in Section 28 Texas Tp." Probably once an occasional component of rich oak savanna and mesic prairie.

Gentiana andrewsii Griseb.
Closed or Bottle Gentian
Occasional. FEN, SHRUB-CARR, WET-MEADOW, and WET-PRAIRIE.

Gentianella quinquefolia (L.) Small **Hanes:** *Gentiana quinquefolia*
Stiff Gentian
Very rare. Alkaline FEN and WET-MEADOW in the E½ of the county.

Gentianopsis crinita (Froel.) Ma **Hanes:** *Gentiana crinita*
Fringed Gentian
Very rare. Sandy WET-MEADOW and WET-PRAIRIE. Most sites have at least mildly alkaline substrates. Most plants have been seen in the W½ of the county.

Gentianopsis procera (Holm) Ma **Hanes:** *Gentiana procera*
Smaller Fringed Gentian
Occasional. FEN, SHRUB-CARR, moist sandy old fields, and sometimes alkaline WET-MEADOW. Difficult to discern from, but much more frequent than, *G. crinita*.

Sabatia angularis (L.) Pursh
Rose-pink; Rose Gentian
Rare. Sandy lakeshores in COASTAL-PLAIN-MARSH. Collected by the Haneses outside of the SW¼ of the county, but to my knowledge now limited to just a few sites, all in Texas Tp.

MENYANTHACEAE (Hanes: Included in GENTIANACEAE**)** **Buckbean Family**

Menyanthes trifoliata L.
Buckbean; Bogbean
Occasional. Wet depressions in BOG and FEN.

APOCYNACEAE **Dogbane Family**

Apocynum androsaemifolium L.
Spreading Dogbane
Occasional. RR rights-of-way, in oak savanna, and at OAK-HARDWOOD-FOREST edges.

The hybrid *Apocynum ×floribundum (A. androsaemifolium* × *A. cannabinum*) is rare throughout in sandy BLACK-OAK-BARREN, and WHITE-OAK-SAVANNA. Called *A.* × *medium* by the Haneses (1947).

Apocynum cannabinum L.
Indian-hemp
Occasional. Sandy wet areas alongside roads and RR rights-of-way, FEN, WET-PRAIRIE, and moist to wet depressions in oak savanna. Includes the Haneses (1947) *A. sibiricum.* Known to hybridize with *A. androsaemifolium* forming the named hybrid *Apocynum* × *floribundum* (see *A. androsaemifolium*).

Vinca minor L.
Periwinkle; "Myrtle"
Common. A diversity of shaded, disturbed situations, usually not far from former plantings. Not native.

ASCLEPIADACEAE **Milkweed Family**

Asclepias amplexicaulis Sm.
Clasping-leaved Milkweed
Collected by the Haneses from BLACK-OAK-BARREN, WHITE-OAK-SAVANNA, openings in OAK-HARDWOOD-FOREST, roadsides, RR rights-of-way, and TERRESTRIAL-PRAIRIE. Now rare throughout in similar habitats.

Asclepias exaltata L. **Hanes:** *A. phytolaccoides*
Poke Milkweed
Rare. Disturbed SUGAR-MAPLE-FOREST, open OAK-HARDWOOD-FOREST, and other lightly wooded situations, especially near lakes. Just N of the county line, and slightly E of Gull Lake, this species was exceedingly abundant in 1998 following selective logging in a hilly SUGAR-MAPLE-FOREST (approx. 50% of the canopy had been removed).

Asclepias hirtella (Pennell) Woodson **Hanes:** *Acerates hirtella*
Prairie Milkweed
Extinct. Known only from a Hanes collection made on the edge of a "white and black oak woodland" on the south boundary of section 36 of Schoolcraft Tp. A few extant sites for this species (1997) occur just south of Kalamazoo County (Porter Tp., St. Joseph Co.) in disturbed former TERRESTRIAL-PRAIRIE and oak savanna.

Asclepias incarnata L.
Swamp Milkweed
Common. Ditches, FEN, WET-MEADOW, WET-PRAIRIE, and other wet, open situations at pond and stream edges, in pastures, and along lakeshores.

Asclepias purpurascens L.
Purple Milkweed
Very rare. Collected by the Haneses from several sites in former oak savanna (sandy BLACK-OAK-BARREN, open OAK-HARDWOOD-FOREST, and WHITE-OAK-SAVANNA) in the S½ of the county. Now nearly extinct. In 1996 I located three blooming plants (no seed was produced) each with 1–3 stems. These were growing on the edge of a degraded OAK-HARDWOOD-FOREST (remnant WHITE-OAK-SAVANNA) in section 28 of Texas Tp (see cover). In 1997 and 1998 the plants were covered with yard waste. Only one stem reappeared in 1999, and no flowers were produced. No other additional sites are known, and other previously known sites have been heavily disturbed, destroyed, now have heavy forest canopy cover, or are otherwise no longer known. Probably once modal in level, mesic WHITE-OAK-SAVANNA and thickets in TERRESTRIAL-PRAIRIE.

Asclepias syriaca L.
Common Milkweed
Common. Open to lightly shaded disturbed situations (but never in heavy shade), especially in old fields and along RR rights-of-way.

Asclepias tuberosa L.
Butterfly-weed
Occasional. RR rights-of-way, roadsides, remnant TERRESTRIAL-PRAIRIE, and oak savanna. *Asclepias tuberosa* ssp. *interior* with leaves broadest above the middle, and cuneate at the base, is by far the most common variety here. *Asclepias tuberosa* ssp. *tuberosa* is much rarer, but has become more frequent since the 1940's when the Haneses were aware of only a single site. *Asclepias tuberosa* f. *lutea* is rare throughout. I suspect that most if not all f. *lutea*, especially along roadsides, are only persisting where once planted or are progeny from cultivated plants.

Asclepias verticillata L.
Whorled Milkweed
Collected by the Haneses from BLACK-OAK-BARREN and TERRESTRIAL-PRAIRIE along roadsides and RR rights-of-way. Now common throughout along expressway rights-of-way and highway roadsides where it may benefit from frequent mowing and mild salinity. In some places lit-

erally tens of thousands of stems carpet the expressway median and/or roadside (McKenna 2002). Easily overlooked.

Asclepias viridiflora Raf. **Hanes:** *Acerates viridiflora*
Green Milkweed
Very rare. Collected by the Haneses and others from oak savanna, an open OAK-HARDWOOD-FOREST (including hillside prairie), and once especially frequent on roadsides and along RR rights-of-way through former TERRESTRIAL-PRAIRIE. Probably once modal in TERRESTRIAL-PRAIRIE where it is now extinct. According to R. Pleznac, this species once persisted with *Baptisia lactea* in pastures on Grand Prairie much as it once did on Prairie Ronde and Gourdneck Prairie. Only one extant site is now known. This is in remnant oak savanna in Fort Custer, and was discovered by P. J. Higman (MNFI). In recent years, populations have disappeared even from protected sites such as the Hampton Creek Consumers Power right-of-way, probably due to fire suppression, herbicide application, and potentially, lack of pollination and subsequent seed production. Like many other of our formerly common and characteristic TERRESTRIAL-PRAIRIE and oak savanna plants, this species is nearly extinct in Kalamazoo County.

Vincetoxicum nigrum (L.) Moench
First collected by H. R. Becker on his farm in Charleston Tp. on 21 October 1950, climbing a shaded fence. Now widespread and occasional in the E½ of the county, especially along roadsides, RR rights-of-way, and in other disturbed open situations, climbing into hedges, fences, small trees, and shrubs. Locally established and spreading. Not in Hanes & Hanes (1947).

CONVOLVULACEAE **Morning-glory Family**

Calystegia hederacea Wall. **Hanes:** *Convolvulus japonicus*
California-rose; Japanese Bindweed
Current status unknown. First collected by the Haneses in 1936. Not native.

Calystegia sepium (L.) R. Br. **Hanes:** *Convolvulus sepium*
Hedge Bindweed
Occasional. FEN, OAK-HARDWOOD-FOREST, fields, and roadsides.

Calystegia spithamaea (L.) Pursh **Hanes:** *Convolvulus spithameus*
Low Bindweed
Occasional? Primarily in the W½ of the county in sandy soil.

Convolvulus arvensis L.
Field Bindweed
Common. Fields, roadsides, RR rights-of-way, and other disturbed situations. Widely established.

Ipomoea hederacea Jacq.
Ivyleaf Morning-glory
Current status unknown. Collected by the Haneses 22 September 1936 from "fencerow of Perrin's garden." Not native. Not in Hanes & Hanes (1947).

Ipomoea pandurata (L.) G. Meyer **Hanes:** *Ipomnoea pandurata*
Wild Sweet-potato; Man-of-the-earth
Current status uncertain, very rare if still extant. Collected by the Haneses from woods and roadsides in sections 4, 5, and 9 of Oshtemo Tp. A single plant was found in September 2002 growing over small *Quercus prinoides* and *Q. velutina* in rich secondary WHITE-OAK-SAVANNA/OAK-BARREN in Texas Tp. very near the former right-of-way of the Michigan Central RR. By the time this flora is published the site will be destroyed by a large residential development. No other plants are known to persist in the county despite repeated searches for them. Most former sites were once relatively open and species rich former OAK-BARREN, but have now developed into closed-canopy OAK-HARDWOOD-FOREST, or have been destroyed by development or other significant disturbance. Collected by F. W. Rapp on 2 August 1946 from the vicinity of Sunset Lake in Vicksburg.

Ipomoea purpurea (L.) Roth **Hanes:** *Ipomnoea purpurea*
Common Morning-glory
Current status unknown. Collected by the Haneses from near "dwellings" and "dumps." Not since known outside of cultivation. Not native.

CUSCUTACEAE **Dodder Family**

Cuscuta campestris Yuncker
Field Dodder
Current status uncertain, very rare if still extant. Collected by the Haneses from the "border of a swamp NE of Goose Lake." Here its hosts included *Bidens* and *Impatiens*. Last observed in 1937.

Cuscuta cephalanthi Engelm.
Buttonbush Dodder
Current status uncertain, very rare if still extant. Collected by the Haneses at "Spring Brook" and from near the SW shore of Indian Lake where it grew on *Salix, Spiraea*, and *Solidago*.

Cuscuta coryli Engelm.
Hazel Dodder
Current status uncertain, very rare if still extant. Collected by the Haneses from Eagle Lake growing on *Aster, Solidago*, and *Stachys hyssopifolia*. Also collected by the Haneses from one mi. E of Sugarloaf Lake growing on *Amphicarpaea, Aster*, and *Ceanothus*. Still occurred on the NW shore of Eagle Lake (1997) in COASTAL-PLAIN-MARSH. In 2002, the COASTAL-PLAIN-MARSH at this site was in bad shape (much purple loosestrife) and no plants were found, perhaps due to recent water level stabilization.

Cuscuta gronovii Schultes
Common or Swamp Dodder
Common. FEN, BOG, and alongside many kinds of wetlands growing on a diversity of hosts, including, but not limited to, *Cephalanthus*, *Cornus, Decodon, Impatiens*, *Laportea, Polygonum,* and *Salix*.

Cuscuta pentagona Engelm.
Field Dodder
Current status uncertain, very rare if still extant. Collected by the Haneses growing on *Agrostis*, *Euphorbia*, and *Rubus* N of Sugarloaf Lake in a sandy old field, and in Camp Custer on *Ceanothus* and *Euphorbia*. Last observed in 1945.

Cuscuta polygonorum Engelm.
Smartweed Dodder
Current status uncertain, very rare if still extant. Collected by the Haneses from *Cephalanthus* near Weeds Lake. Last observed in 1941.

POLEMONIACEAE **Phlox Family**

Phlox bifida L. C. Beck
Sand Phlox
Current status uncertain, very rare if still extant. Collected by the Haneses from a RR right-of-way on Prairie Ronde, 1–1.25 mi. S of Schoolcraft (Hanes 1938). Many other interesting and rare prairie plants persist in this area. Last collected by H. E. Ballard and R. W. Pippen on 31 April 1981 (MSC). This area has since been partly bulldozed and the plants have not been relocated. However, the plants do not always flower, and may easily be overlooked (R. W. Pippen pers. comm.). I have not located any plants despite more than a dozen visits to the area between 1996 and 2002.

Phlox divaricata L.
Wild Blue Phlox
Occasional. SUGAR-MAPLE-FOREST.

Phlox paniculata L.
Perennial or Garden Phlox
Occasional. Roadsides, and old homesites where it may merely persist from past cultivation. Not native.

Phlox pilosa L.
Prairie Phlox
Probably once abundant in TERRESTRIAL-PRAIRIE on Prairie Ronde and elsewhere in prairie and oak savanna (see the account of Prairie Ronde by Brown 1881, as cited in Chapman 1984 in the section on *Terrestrial Prairie*, Appendix III). Now occasional in oak savanna and FEN.

Phlox subulata L.
Moss-pink; Moss Phlox
A rare escape from cultivation. Known today only from a cemetery and a roadside, both in the SE¼ of the county.

HYDROPHYLLACEAE **Waterleaf Family**

Hydrophyllum appendiculatum Michaux
Great Waterleaf
Common. SUGAR-MAPLE-FOREST and HARDWOOD-SWAMP.

Hydrophyllum canadense L.
Broadleaved or Canada Waterleaf
Occasional. SUGAR-MAPLE-FOREST. Not as frequent as *H. appendiculatum*.

Hydrophyllum virginianum L.
Virginia Waterleaf
Occasional. SUGAR-MAPLE-FOREST, primarily in the SE¼ of the county.

BORAGINACEAE **Borage Family**

Cynoglossum officinale L.
Hound's-tongue
Rare. Usually in relatively dry soil at forest edges, and in old fields.

Echium vulgare L.
Viper's Bugloss; Blueweed
Rare. Roadsides and RR rights-of-way. Not native.

Hackelia virginiana (L.) I. M. Johnston
Johnston Beggar's-lice
Occasional. Most forested terrestrial situations. Often especially abundant in SUGAR-MAPLE-FOREST.

Lappula squarrosa (Retz.) Dumort. **Hanes:** *L. echinata*
Stickseed
Current status uncertain. Roadsides and RR rights-of-way. Not native.

Lithospermum arvense L.
Corn Gromwell
Occasional. RR rights-of-way, roadsides, and old fields. Not native.

Lithospermum canescens (Michaux) Lehm.
Hoary Puccoon
Very rare. Collected by the Haneses from oak savanna and TERRESTRIAL-PRAIRIE, primarily in the W½ of the county. Now lacking from most former sites. Nearly extinct.

Lithospermum caroliniense (J. F. Gmelin) MacMillan **Hanes:** *L. croceum*
Hairy or Yellow Puccoon
Rare. Collected by the Haneses from sandy oak savanna, old fields, and other open dry sandy habitats. Now rare in similar situations, and lacking from many former sites. Planted in a BLACK-OAK-BARREN reconstruction immediately S of the commuter lot SE of the intersection of Centre St. and US 131, Kalamazoo.

Myosotis arvensis (L.) Hill
Occasional. Known from open to lightly shaded disturbed situations. Not native. Not in Hanes & Hanes (1947).

Myosotis scorpioides L.
Forget-me-not
Occasional. Disturbed wet situations including along lakeshores, streams, and the Kalamazoo River. Not native.

Myosotis stricta Roemer & Schultes **Hanes:** *M. micrantha*
Current status unknown. Collected by the Haneses from the "Vicksburg cemetery S of the highway." Not native.

Myosotis verna Nutt.
White Forget-me-not
The few plants I have seen grew in shady situations in relatively dry sandy soil near lakeshores.

Plagiobothrys hirtus (Greene) I. M. Johnston
Popcorn-flower
Current status unknown. Collected by the Haneses from "a moist meadow one mi. W of the grain elevator at Schoolcraft" in 1938 and 1939 (Voss 1996; Hanes 1940, Hanes & Hanes 1947). Not native.

VERBENACEAE **Vervain Family**

Phryma leptostachya L.
Lopseed
Occasional. OAK-HARDWOOD-FOREST and SUGAR-MAPLE-FOREST. Included in the Haneses' (1947) PHYRMACEAE.

Phyla lanceolata (Michaux) Greene **Hanes:** *Lippia lanceolata*
Fog-fruit
Current status uncertain. Collected by the Haneses from two sites near the Kalamazoo River, and a third site (only one plant) "on the E shore of Austin Lake."

Verbena bracteata Lag. & Rodr.
Prostrate or Creeping Vervain
Occasional. Relatively open, rich, disturbed ground. Not native.

Verbena hastata L.
Blue Vervain
Occasional. FEN, WET-MEADOW, SHRUB-CARR, and WET-PRAIRIE.
The hybrid *Verbena* ×*engelmannii* (*V. hastata* × *V. urticifolia*) is rare throughout where both parents co-occur.

Verbena stricta Vent.
Hoary Vervain
Occasional. Old fields, roadsides, and RR rights-of-way. Usually in dry sandy soil. Not native.

Verbena urticifolia L.
White Vervain
Occasional. Forest edges with wetlands. Known to hybridize with *V. hastata* forming the named hybrid *Verbena* ×*engelmannii* (see *V. hastata*).

LABIATAE (LAMIACEAE) **Mint Family**

Acinos arvensis (Lam.) Dandy
Mother-of-thyme; Basil-thyme
Current status unknown. Collected by the first botanical survey. Not native. Not in Hanes & Hanes (1947).

Agastache nepetoides (L.) Kuntze
Giant Hyssop
Occasional? SUGAR-MAPLE-FOREST, OAK-HARDWOOD-FOREST (probably at least in part as a relict from former WHITE-OAK-SAVANNA), and nearby old fields and fencerows.

Agastache scrophulariifolia (Willd.) Kuntze **Hanes:** *A. scrophulariaefolia*
Figwort Giant Hyssop
Collected by the Haneses from "fencerows and fields" essentially throughout. Probably once occurred in all but the driest oak savannas.

Ajuga reptans L.
Rare. Lawns and roadsides. Not native.

Blephilia ciliata (L.) Bentham
Downy Blephilia
Rare. Dry sandy BLACK-OAK-BARREN in the W½ of the county.

Blephilia hirsuta (Pursh) Bentham
Wood Mint
Occasional. Relatively wet SUGAR-MAPLE-FOREST.

Clinopodium vulgare L. **Hanes:** *Satureja vulgaris*
Wild-basil; Dog-mint
Current status uncertain. Collected by the Haneses from "oak woods" and "roadsides." Collected in 1994 by P. J. Higman and S. Grund in the NE¼ of the county, but not otherwise recently known. Not native.

Collinsonia canadensis L.
Stoneroot; Horse-balm
Occasional. SUGAR-MAPLE-FOREST.

Dracocephalum parviflorum Nutt.
Dragonhead
Collected by the Haneses on 13 June 1937 in alfalfa on the H. R. Becker farm (Charleston Tp.). Adventive.

Glechoma hederacea L. **Hanes:** *Glecoma hederacea*
Ground-ivy; Gill-over-the-ground; Creeping Charlie
Occasional. Moist to wet situations including disturbed swamp forests, roadsides, and old fields. Widely established.

Hedeoma hispida Pursh
Rough Pennyroyal
Rare. Dry, sandy soil in old fields and along roadsides, primarily in the W½ of the county.

Hedeoma pulegioides (L.) Pers.
American Pennyroyal
Current status unknown. Collected by the Haneses from "oak woods" essentially throughout.

Hyssopus officinalis L.
Hyssop
Current status unknown. An early collection (probably made by the first botanical survey) is known from a Kalamazoo roadside (GH). Reported by Elliott (1960) as an "infrequent member of old field

succession" in Ross Tp. (but I am not aware of a supporting specimen). No Michigan specimens have been seen since 1918 (Voss 1996). Not in Hanes & Hanes (1947). Not native.

Lamium amplexicaule L.
Henbit
Occasional. Old fields and waste places. Not native.

Lamium maculatum L.
Probably a rare escape from cultivation in waste places throughout. Not in Hanes & Hanes (1947).

Lamium purpureum L.
Purple Dead Nettle
Occasional. Gardens, lawns, and other disturbed situations. Locally common on the WMU campus (1996). Not native.

Leonurus cardiaca L.
Motherwort
Common. Lawns and waste places. Not native.

Lycopus americanus W. P. C. Barton
American Water Horehound
Occasional. Often in marly wetlands. Usually in lightly shaded situations in FEN, WET-MEADOW, and SHRUB-SWAMP.

Lycopus rubellus Moench
Water Horehound
Current status unknown. Collected by the Haneses from "wooded swamps" essentially throughout.

Lycopus uniflorus Michaux
Bugleweed
Occasional. COASTAL-PLAIN-MARSH and sandy WET-MEADOW, primarily in the W½ of the county.

Lycopus virginicus L.
Bugleweed
Current status uncertain. Collected by the Haneses from "peaty woods" N of Vicksburg, and from Schoolcraft and Texas Tps. Reportedly "infrequent" in "marsh" near the Kalamazoo River at the Augusta Floodplain Forest Preserve (Meagher & Tonsor 1992).

Marrubium vulgare L.
Horehound
Probably an occasional escape from cultivation throughout the county.

Melissa officinalis L.
Lemon-balm
Current status unknown. Collected by the Haneses from roadsides and the edge of a "cathole." Collected by F. W. Rapp from his woods. Not native.

Mentha arvensis L.
Wild Mint
Occasional? Disturbed lakeshores. Not native.

The hybrid *Mentha ×cardiaca* (*M. arvensis × M. spicata)* has been collected in Kalamazoo County (Voss 1996).

Mentha spicata L.
Spearmint
Rare. Roadsides. Not native. Known to hybridize with *M. arvensis* forming the named hybrid *Mentha ×cardiaca* (see *M. arvensis*).

Mentha suaveolens Ehrh. **Hanes:** *M. rotundifolia*
Apple or Pineapple Mint
Current status unknown. Collected by F. W. Rapp and the Haneses from several locations in the S½ of the county between 1935 and 1941. Not native.

Mentha ×piperita L. **Hanes:** *M. piperita*
Peppermint
Current status uncertain. Disturbed swamp forest and other disturbed situations, especially near roadsides. Not native.

Monarda didyma L.
Oswego-tea; Bee-balm
Collected by the Haneses on 13 July 1953 from a Schoolcraft roadside. Not likely native. Not in Hanes & Hanes (1947).

Monarda fistulosa L.
Wild-bermagot
Common. Old fields, FEN, WET-PRAIRIE, TERRESTRIAL-PRAIRIE, and mesic oak savanna. This showy species has relatively wide ecological amplitude.

Monarda punctata L.
Dotted or Horse Mint
Occasional. Sandy old fields and BLACK-OAK-BARREN.

Nepeta cataria L.
Catnip; Catmint
Occasional. Forest edges and old homesites. Locally established, not native.

Physostegia virginiana (L.) Bentham **Hanes:** *P. speciosa*
False Dragonhead; Obedient Plant
Current status uncertain, very rare if still extant. Collected by the Haneses from several locations on the floodplain of the Kalamazoo River including E and W of Comstock, E of Galesburg, and in section 4 of Cooper Tp. Probably native.

Prunella vulgaris L.
Self-heal; Heal-all
Occasional. Lawns and other open disturbed situations. Both native and introduced plants probably occur here (Voss 1996).

Pycnanthemum tenuifolium Schrader **Hanes:** *P. flexuosum*
Narrow-leaved Mountain Mint
Extinct. Known only from a 1933 Hanes collection made from a fencerow on Prairie Ronde (former TERRESTRIAL-PRAIRIE) between sections 12 and 13 of Prairie Ronde Tp. Noted by the Haneses to be absent the following year. Not again observed or collected in Kalamazoo County.

Pycnanthemum virginianum (L.) B. L. Rob. & Fernald
Mountain Mint
Occasional. FEN, WET-PRAIRIE, TERRESTRIAL-PRAIRIE, and WET-MEADOW.

Salvia azurea Lam.
Blue Sage
Current status unknown. Collected by the Haneses from a RR right-of-way N of Vicksburg near the Prudential Nursery. Not native.

Salvia reflexa Hornem.
Rocky Mountain Sage
Collected by the Haneses from “3 mi. SE of Schoolcraft in a field” (Schoolcraft Tp.) where it was “rare” (Hanes & Hanes 1947; Hermann 1936). Adventive.

Satureja hortensis L. **Hanes:** *S. vulgaris*
Summer Savory
Rare. OAK-HARDWOOD-FOREST. Not native.

Scutellaria elliptica Sprengel
Hairy Skullcap
Current status uncertain. Collected by the Haneses from WHITE-OAK-SAVANNA, BLACK-OAK-BARREN, and open hillsides in OAK-HARDWOOD-FOREST.

Scutellaria galericulata L. **Hanes:** *S. epilobifolia*
Marsh Skullcap
Occasional. On pond, river, and lake borders in WET-MEADOW, FEN, and EM-MARSH.

Scutellaria lateriflora L.
Mad-dog Skullcap
Occasional. Open WET-MEADOW, FEN, rich HARDWOOD-SWAMP, and in other swampy situations.

Stachys hyssopifolia Michaux
Hedge Nettle
Occasional. Moist sandy situations, especially COASTAL-PLAIN-MARSH, and mostly limited to the W½ of the county.

Stachys palustris L.
Collected by the Haneses from SE of Austin Lake in sandy EM-MARSH/COASTAL-PLAIN-MARSH.

Stachys tenuifolia Willd.
Smooth Hedge Nettle
Collected by the Haneses from near the Kalamazoo River, and from Brady Tp. in "moist" ground. Reportedly "infrequent" in a "wet thicket" under a dense canopy of shrubs along the Kalamazoo River at the Augusta Floodplain Forest Preserve (Meagher & Tonsor 1992).

Teucrium canadense L.
Wood-sage
Known from EMERGENT-MARSH near the Kalamazoo River, a disturbed roadside through SUGAR-MAPLE-FOREST in the NE¼ of the county, and from the vicinity of large wetlands in Prairie Ronde Tp. Includes the Haneses' (1947) *T. occidentale*.

Trichostema dichotomum L.
Bastard-pennyroyal
Extinct. Collected by the Haneses from "a sterile sandy field on the border of an oak wood in Section 7 Oshtemo Tp." (Hanes 1941). Last seen in 1951 in a sandy BLACK-OAK-BARREN NW of the intersection of 2nd St. and S Ave.

SOLANACEAE **Nightshade Family**

Datura stramonium L.
Jimsonweed
Occasional. Hog yards, pastures, and waste places. Not native.

Lycium chinense Miller
Current status unknown. Collected by the Haneses from roadsides in the S½ of the county. Not native.

Lycopersicon esculentum Miller
Tomato
A rare escape from recent cultivation throughout the county. Usually at or near sites where garden waste is dumped. Not in Hanes & Hanes (1947). Not native.

Petunia ×atkinsiana Loudon
Petunia
Rare. Roadsides and old fields. Usually at or near sites where garden waste is dumped. Not in Hanes & Hanes (1947). First collected by the Haneses "near Schoolcraft Park" on "roadsides" 14 July 1936. Not native.

Physalis alkekengi L. **Hanes:** *P. ambigua*
Chinese-lantern-plant
Current status unknown. Collected by the Haneses from roadsides, fields, and orchards. Not native.

Physalis heterophylla Nees
Occasional. Old fields, roadsides, and occasionally RR rights-of-way.

Physalis longifolia Nutt. **Hanes:** *P. subglabrata*
Smooth Ground Cherry
Occasional? Open grassy situations including old fields and especially RR rights-of-way.

Physalis virginiana Miller
Virginia Ground Cherry
Rare. Relatively intact BLACK-OAK-BARREN, WHITE-OAK-SAVANNA, RR rights-of-way, and on hillsides, primarily in the W½ of the county.

Solanum carolinense L.
Horse-nettle
Occasional. Old fields, pastures, fencerows, and roadsides. Not native.

Solanum dulcamara L.
Nightshade; Bittersweet
Common in a diversity of more or less disturbed situations. Not native.

Solanum physalifolium Rusby
Hairy or Argentinian Nightshade
A recent introduction, probably still rare (but apparently spreading) in disturbed ground throughout the county. First collected by T. Trana 21 September 1993 (MICH). Not native. Not in Hanes & Hanes (1947).

Solanum ptychanthum Dunal **Hanes:** *S. nigrum*
Black Nightshade
Occasional. Recently disturbed situations along roadsides, at construction sites, etc. Not native.

Solanum rostratum Dunal
Buffalo-Bur
Collected a few times by the Haneses, but apparently then infrequent. Now occasional in old fields and other grassy disturbed situations. Not native.

Solanum tuberosum L.
Potato
Occasional. Waste places. May persist at the site of old gardens or where dumped. First collected by F. W. Rapp on 1 August 1946. Not native. Not in Hanes & Hanes (1947).

SCROPHULARIACEAE **Snapdragon Family**

Several species of *Veronica* are reported here based solely on annotations made to specimens in the Hanes herbarium by E. G. Voss and included in his treatment of this genus for Volume III of Michigan Flora (1996).

Agalinis gattingeri (Small) Small **Hanes:** *Gerardia gattingeri*
Gattinger's Gerardia
Extinct. Collected by the Haneses in 1935 SE of Sugarloaf Lake at the edge of a small sandy rise of

former oak savanna in what was otherwise species rich WET-PRAIRIE. The immediate site was probably sandy wet or wet-mesic prairie. The entire site including most of the surrounding WET-PRAIRIE has been heavily grazed and the rich assemblage of rare prairie and savanna plants that the Haneses collected here has mostly disappeared.

Agalinis paupercula (A. Gray) Britton **Hanes:** *Gerardia paupercula*
Occasional. At the margins of lakes and streams.

Agalinis purpurea (L.) Pennell **Hanes:** *Gerardia purpurea*
Purple Gerardia
Occasional. On sandy lakeshores and in COASTAL-PLAIN-MARSH.

Agalinis tenuifolia (Vahl) Raf. **Hanes:** *Gerardia tenuifolia*
Current status uncertain, very rare if still extant. Collected only by the Haneses from "an open oak woodland on the E side of Stony L."

Aureolaria flava (L.) Farw.
Smooth False Foxglove
Occasional. WHITE-OAK-SAVANNA and BLACK-OAK-BARREN, usually associated with White Oak. This perennial is known to hybridize with *A. pedicularia* in Kalamazoo County (Voss 1996; Ballard & Pippen 1991). Hybrids still occur at the interface between sandy oak savanna and OAK-HARDWOOD-FOREST at the Hampton Creek Consumers Power right-of-way (Gourdneck State Game Area).

Aureolaria pedicularia (L.) Raf. **Hanes:** *A. pedicularis*
Clammy False Foxglove
Occasional. Usually associated with Black Oak in relatively open OAK-HARDWOOD-FOREST, BLACK-OAK-BARREN, and at the edges of overgrown WHITE-OAK-SAVANNA.

Aureolaria virginica (L.) Pennell
Downy False Foxglove
Occasional. Often at the edges of OAK-HARDWOOD-FOREST, and overgrown WHITE-OAK-SAVANNA and BLACK-OAK-BARREN.

Besseya bullii (Eaton) Rydb.
Kitten-tail
Very rare. Collected by the Haneses from hillside prairie at Eagle Lake, West Lake, McGinnis Lake, and Crooked Lake. Also collected by the Haneses from relatively species rich BLACK-OAK-BARREN near the aforementioned hillside prairie at Crooked Lake. Collected 20 May 1932 by Lela Kelly "near hospital farm" in "open places." Also collected from along the W fork of Portage Creek in section 5 of Portage Tp., in dry hillside oak forest (probably former hillside prairie). In 1999 I found a few sterile plants growing in overgrown hillside prairie at Crooked Lake, but from 1996–2002 in searches that encompassed all but two known former sites, and several potential sites for hillside prairie, no other plants were located (though these searches should not be considered exhaustive). In fact, vanishingly little hillside prairie was found. Most sites had succeeded to closed-canopy OAK-HARDWOOD-FOREST or were occupied by homes. It is possible that I overlooked plants, but clearly this Midwestern endemic is nearly extinct in Kalamazoo County. Development of hillside prairies, canopy closure, and shrub encroachment are apparently significant factors accounting for its present rarity. It is possible that in the past, hillsides where this plant grew were kept open by severe drought and less so by fire, although today, drought alone does not seem sufficient to retard forest formation on even the driest formerly somewhat open hillsides. Probably once an occasional component of dry oak savanna.

Buchnera americana L.
Blue-hearts
Extinct. Collected by the first botanical survey 28–31 August 1837. Also collected by the first botanical survey 23 July 1838. An additional unlabeled sheet at WMU is probably a first botanical survey

collection. The habitat and location of all known collections are unknown, but this plant was probably a component of the former savanna flora. Not in Hanes & Hanes (1947).

Castilleja coccinea (L.) Sprengel
Indian Paintbrush
Castilleja coccinea f. *lutescens* (called f. *pallens* by the Haneses) has a bright yellow calyx and bracts, rather than red. Forma *lutescens* is rare in FEN, WET-MEADOW, and sandy wet-mesic to WET-PRAIRIE. The red-flowered form is even less common, and was last collected by the Haneses from "marshy meadows" in section 18 of Richland Tp. and section 6 of Oshtemo Tp. It is otherwise known only from a Hanes collection from WET-PRAIRIE near Sugarloaf Lake (now heavily grazed). I have not located any plants at this former site despite half a dozen visits. Current status of the red flowered form is uncertain, but it is clearly very rare, if still extant.

Chaenorrhinum minus (L.) Lange
Dwarf-snapdragon
Occasional in ballast along RR rights-of-way.

Chelone glabra L.
Turtlehead
Occasional. FEN, WET-MEADOW, SHRUB-CARR, and WET-PRAIRIE.

Collinsia verna Nutt.
Blue-eyed-Mary
Rare. Rich SUGAR-MAPLE-FOREST. A winter annual. No longer occurs at several former sites including the "Island" woods in Schoolcraft.

Gratiola neglecta Torrey
Clammy Hedge-hyssop
Current status uncertain. Collected by the Haneses from an "old muddy creek bed" in section 31 of Wakeshma Tp. (Hanes 1941).

Linaria canadensis (L.) Dum. Cours.
Blue Toadflax
Occasional. Sandy soil of BLACK-OAK-BARREN and open sandy OAK-HARDWOOD-FOREST.

Linaria dalmatica (L.) Miller
Dalmatian Toadflax
Current status unknown. First collected from along a roadside in 1962. Not in Hanes & Hanes (1947). Not native.

Linaria vulgaris Miller
Butter-and-eggs
Occasional. Roadsides and RR rights-of-way.

Lindernia dubia (L.) Pennell **Hanes:** *L. anagallidea*
False Pimpernel
Current status uncertain. EM-MARSH. Some authors recognize *L. dubia* var. *anagallidea* as a distinct species. However, intermediates with characters similar to both the species and variety have been found in Kalamazoo County. Purported "*anagallidea*" (regardless of the rank, if any, at which it is recognized), has only been reported by the Haneses from a pond just E of Gourdneck Lake between the years 1936 and 1942. The plants grew in mud, had many branches, and produced many flowers. When visited in later years with more water, the plants were under water and produced few flowers. These submerged plants had erect stems, unlike the plants seen in previous relatively dry years (Hanes 1938).

Melampyrum lineare Desr.
Cow-wheat
Occasional. Sandy OAK-HARDWOOD-FOREST.

Mimulus glabratus Kunth
Yellow Monkey Flower
Current status uncertain. EM-MARSH along lakeshores and streams, and in wet, springy areas in FEN and WET-MEADOW.

Mimulus ringens L.
Square-stemmed Monkey Flower
Occasional. EM-MARSH along lakeshores, in COASTAL-PLAIN-MARSH, WET-MEADOW, FEN, and WET-PRAIRIE.

Pedicularis canadensis L.
Early Wood Betony
Occasional. Often at sandy OAK-HARDWOOD-FOREST edges in former WHITE-OAK-SAVANNA and BLACK-OAK-BARREN. Probably once also a component of TERRESTRIAL-PRAIRIE.

Pedicularis lanceolata Michaux
Swamp Wood Betony
Occasional. Moist to wet, usually forested situations.

Penstemon digitalis Sims
Foxglove Beard-tongue
Rare. Moist to wet, usually sandy old fields.

Penstemon hirsutus (L.) Willd.
Hairy Beard-tongue
Extinct. Collected by the Haneses from RR rights-of-way and other marginal habitats in areas of sandy former WHITE-OAK-SAVANNA.

Penstemon pallidus Small
Small Pale Beardtongue
Extinct. Collected by the Haneses from "sandy moist or dry soil" along a roadside through WHITE-OAK-SAVANNA and from a RR right-of-way on Prairie Ronde in TERRESTRIAL-PRAIRIE. Not since collected.

Scrophularia lanceolata Pursh
Rare to occasional throughout on Prairie Ronde, Gourdneck Prairie, and elsewhere primarily in the SW¼ of the county in fencerows and along roadsides. May have once been a component of TERRESTRIAL-PRAIRIE.

Scrophularia marilandica L.
Figwort
Occasional. SUGAR-MAPLE-FOREST.

Verbascum blattaria L.
Moth Mullein
Occasional. Roadsides, RR rights-of-way, old fields, and other waste places. Widely established.

Verbascum phlomoides L.
Occasional. First collected in Michigan in 1941 by the Haneses from a roadside 1.5 mi. W of Schoolcraft (Hanes 1943). Not native.

Verbascum thapsus L.
Mullein; Flannel Plant
Common. A diversity of disturbed open situations. Widely established.

Veronica anagallis-aquatica L. **Hanes:** *V. connata* & *V. salina*
Water Speedwell
Occasional? Streams and ditches. Both native and introduced plants occur in Kalamazoo County.

Veronica arvensis L.
Field Speedwell
Occasional. Fields, pastures, and quite generally in disturbed situations throughout. Not native.

Veronica austriaca L. **Hanes:** *V. teucrium*
Current status unknown. First collected 14 June 1935. All collections are from near old homesties and roadsides. Not native. Not in Hanes & Hanes (1947).

Veronica beccabunga L. **Hanes:** *V. americana*
Brooklime
Current status unknown. Collected by the Haneses from the border of Allen Creek in section 25 of Kalamazoo Tp. Both native and introduced plants occur here.

Veronica chamaedrys L. **Hanes:** probably *V. teucrium*
Germander Speedwell
Current status unknown. Collected by the Haneses from roadsides and lawns. Also reported by Elliott (1960). Not native.

Veronica filiformis Sm.
Creeping Speedwell
Current status unknown. First collected in Michigan from Kalamazoo and Washtenaw Counties in 1978. Not in Hanes & Hanes (1947). Not native.

Veronica officinalis L.
Common Speedwell
Occasional? Wet disturbed forests and waste places. Not native.

Veronica peregrina L.
Purslane Speedwell
Occasional. Lawns, fields, and disturbed lakeshores.

Veronica persica Poiret
Bird's-eye Speedwell
Occasional. Lawns. Not native.

Veronica polita Fries
Current status unknown. First collected in 1937 from a lawn in Schoolcraft. Not native. Not in Hanes & Hanes (1947).

Veronica scutellata L.
Marsh Speedwell
Occasional? Ditches and lakeshores.

Veronica serpyllifolia L.
Thyme-leaved Speedwell
Common. Lawns. Not native.

Veronicastrum virginicum (L.) Farw.
Culver's-root
Occasional. RR rights-of-way and roadsides, TERRESTRIAL-PRAIRIE, WET-PRAIRIE, FEN, WHITE-OAK-SAVANNA, BUR-OAK-SAVANNA, and mesic to wet-mesic situations in BLACK-OAK-BARREN. Essentially a prairie and oak savanna plant with wide ecological amplitude.

BIGNONIACEAE **Bignonia or Trumpet-creeper Family**

Campsis radicans (L.) Bureau
Trumpet-creeper; Trumpet-flower
Rare. Former homesites, and old fields. Not native.

Catalpa bignonioides Walter
Common Catalpa
A May 1934 roadside collection from near Barton Lake is probably this species (Voss 1996). Probably not native.

Catalpa speciosa (Warder) Engelm.
Catalpa; Cigar-tree
A widespread and occasional escape from cultivation along roadsides, in old fields, and in degraded OAK-HARDWOOD-FOREST and BLACK-OAK-BARREN. Locally established.

OROBANCHACEAE **Broom-rape Family**

Conopholis americana (L.) Wallr.
Squaw-root
Occasional. OAK-HARDWOOD-FOREST.

Epifagus virginiana (L.) W. P. C. Barton
Beech-drops
Occasional. SUGAR-MAPLE-FOREST with *Fagus grandifolia*.

Orobanche uniflora L.
One-flowered Broomrape
Current status uncertain, very rare if still extant. Collected by the Haneses from an "oak and pine wood" near "Deep Point," Long Lake, and collected by H. R. Becker from woods in section 30 of Charleston Tp.

LENTIBULARIACEAE **Bladderwort Family**

Utricularia cornuta Michaux
Horned Bladderwort
Occasional. Usually in marly depressions in lakeside FEN.

Utricularia gibba L.
Humped Bladderwort
Occasional. BOG and relatively acid lakeshore substrates including peaty sand and muck.

Utricularia intermedia Hayne
Flat-leaved Bladderwort
Occasional. FEN and BOG.

Utricularia minor L.
Lesser Bladderwort
Current status unknown. Collected by the Haneses from the muddy border of Whites Lake, and from marly, excavated depressions alongside Lyons Lake.

Utricularia purpurea Walter
Purple Bladderwort
Occasional. Sandy lakeshores including COASTAL-PLAIN-MARSH, primarily in the W½ of the county.

Utricularia resupinata Bigelow
Reversed Bladderwort
Occasional in COASTAL-PLAIN-MARSH in the W½ of the county.

Utricularia vulgaris L.
Common Bladderwort
Common. EM-MARSH.

PLANTAGINACEAE **Plantain Family**

Plantago arenaria Waldst. & Kit. **Hanes:** *P. indica*
Psyllium
Current status unknown. Collected by the Haneses from "E of the Kalamazoo River near Roadside Park" (Hanes 1938). Not native.

Plantago aristata Michaux
Bracted Plantain
Occasional. Dry disturbed open situations. Not native.

Plantago lanceolata L.
Ribgrass; Buckhorn; Narrow-leaved or English Plantain
Occasional. Old fields, roadsides, and other open disturbed situations. Not native.

Plantago major L.
Common Plantain
Occasional. Moist roadsides, lawns, and other disturbed situations. Not native.

Plantago patagonica Jacq. **Hanes:** *P. purshii*
Current status uncertain. Sandy, dry, disturbed situations such as roadsides and old fields. Adventive.

Plantago rugelii Decne.
Rugel's Plantain
Common. Gardens, old fields, and lawns. May not be native (Voss 1996).

Plantago virginica L.
Dwarf Plantain
Current status unknown. Collected by the Haneses from roadsides and other disturbed situations. Not native.

RUBIACEAE **Madder Family**

Several species of *Galium* are reported here based only upon annotations made by E. G. Voss and mapped in Volume III of Michigan Flora (1996).

A specimen of *Houstonia caerulea* L., (Bluets) is in the A. C. Roberts collection (KVM), but bears no label data. Since I cannot be sure that it was collected outside of cultivation in Kalamazoo County, I have not included it in the list below.

Cephalanthus occidentalis L.
Buttonbush
Common. SHRUB-SWAMP and other shrubby wetlands, often near lakeshores. An important component of the "shrub-zone" in COASTAL-PLAIN-MARSH.

Galium aparine L.
Goosegrass; Cleavers
Common. SUGAR-MAPLE-FOREST and OAK-HARDWOOD-FOREST.

Galium asprellum Michaux
Rough Bedstraw
Occasional. FEN.

Galium boreale L.
Northern Bedstraw
Occasional. RR rights-of-way, FEN, WET-PRAIRIE, oak savannas, and TERRESTRIAL-PRAIRIE.

Galium brevipes Fernald & Wiegand
Collected only by F. W. Rapp from "E of Portage Creek, 4 mi. NE of Vicksburg" on 3 August 1941. Another F. W. Rapp collection with the same date reads "4 mi. NE Vicksburg, bank of ditch." Not in Hanes & Hanes (1947). Included in the Haneses' (1947) *G. trifidum*.

Galium circaezans Michaux
Wild Licorice
Occasional. OAK-HARDWOOD-FOREST.

Galium concinnum T. & G.
Shining Bedstraw
Occasional. OAK-HARDWOOD-FOREST, and forest edges in wet areas near swamps and streams.

Galium labradoricum (Wiegand) Wiegand
Labrador Bedstraw
Occasional. Usually found in *Sphagnum* moss in the shadow of Tamarack trees in BOG.

Galium lanceolatum Torrey
Wild Licorice
Occasional? OAK-HARDWOOD-FOREST and shrubby BLACK-OAK-BARREN.

Galium obtusum Bigelow
Wild Madder
Occasional. FEN, WET-MEADOW, and EM-MARSH.

Galium palustre L.
Marsh Bedstraw
Occasional? Mostly in the E½ of the county in WET-MEADOW and FLOODPLAIN-FOREST near the Kalamazoo River.

Galium pilosum Aiton
Hairy Bedstraw
Occasional? Sandy BLACK-OAK-BARREN and OAK-HARDWOOD-FOREST.

Galium tinctorium L.
Occasional. Mostly limited to the S½ of the county at forest edges with EM-MARSH, WET-MEADOW, and FEN.

Galium trifidum L.
Small Bedstraw
Occasional at stream margins throughout.

Galium triflorum Michaux
Sweet-scented Bedstraw
Occasional in a diversity of moist to wet forests.

Houstonia canadensis Roemer & Schultes
Fringed Houstonia
Extinct. Collected by the Haneses from along the W fork of Portage Crk. in Section 5 Portage Tp. in very dry oak forest on a hillside (perhaps former hillside prairie) alongside a creek. The plants were associated with *Selaginella rupestris*, *Besseya bullii*, and other rare xerophytes.

Mitchella repens L.
Partridge-berry
Common. TAMARACK-SWAMP, RED-MAPLE-SWAMP, and ASH-SWAMP. Also occasionally found in relatively dry soil in OAK-HARDWOOD-FOREST.

Sherardia arvensis L.
Field-madder
Current status unknown. First collected by L. A. Kenoyer on the WMU campus in 1933. Not native. Not in Hanes & Hanes (1947).

CAPRIFOLIACEAE **Honeysuckle Family**

Diervilla lonicera Miller
Bush-honeysuckle
Current status uncertain, very rare if still extant. Collected by the Haneses from several widely scattered locations in the W½ of the county. I have been unable to relocate plants at several of the former sites (primarily in open OAK-HARDWOOD-FOREST).

Linnaea borealis L.
Twinflower
Current status uncertain, very rare if still extant. Once "plentiful over several acres" of TAMARACK-SWAMP/RED-MAPLE-SWAMP S of Little Sugarloaf Lake. Also known from "a few plants among tamaracks at Paw Paw Lake" (Hanes & Hanes 1947). Apparently extirpated from S of Little Sugarloaf Lake. Its absence is perhaps due to past hydrological changes associated with the construction of US 131, and/or recent clear-cutting of most of the swamp forest at the site. Not relocated at Paw Paw Lake, but may persist there in areas that remain unsearched.

Lonicera canadensis Marshall
Fly Honeysuckle
Current status unknown. Known by the Haneses from TAMARACK-SWAMP near Barton Lake, and from the N boundary of section 7 of Wakeshma Tp.

Lonicera dioica L.
Glaucous Honeysuckle
Occasional. FEN, WET-MEADOW, and openings in TAMARACK-SWAMP and RED-MAPLE-SWAMP. Usually near lakes or streams.

Lonicera japonica Thunb.
Japanese Honeysuckle
Occasional outside of cultivation in a diversity of disturbed situations. Not native.

Lonicera maacki (Rupr.) Herder
Amur Honeysuckle
Common outside of cultivation in a diversity of wooded and open situations. Becoming a serious pest in some of our forests and remnant oak savannas. Widely planted. Not native. Not in Hanes & Hanes (1947).

Lonicera morrowii A. Gray
Morrow Honeysuckle
First collected outside of cultivation in Michigan in Kalamazoo County by F. W. Rapp in 1939. Now common throughout along RR rights-of-way and roadsides, and in old fields.

Lonicera* × *bella Zabel
This hybrid (*L. morrowii* × *L. tatarica*) is occasional throughout the county in the same situations as our other weedy honeysuckles: roadsides, thickets, and dry-mesic terrestrial forests. Will backcross (Voss 1996). Not native.

Lonicera oblongifolia (Goldie) Hooker
Swamp Fly Honeysuckle
Current status unknown. Collected by the Haneses from section 23 of Alamo Tp. near the shore of Mud (Veley) Lake.

Lonicera sempervirens L.
Trumpet Honeysuckle
Current status unknown. Collected by the Haneses from the SW¼ of the county. Not native.

Lonicera tatarica L.
Tartarian Honeysuckle
Common. Young regenerating forest and the understory of OAK-HARDWOOD-FOREST. Sometimes in old fields. Widely established.

Lonicera xylosteum L.
European Fly Honeysuckle
Occasional outside of cultivation, invading old fields and degraded and disturbed dry to moist forests and thickets. Not native.

Sambucus canadensis L.
Common Elder
Occasional. Fencerows, SUGAR-MAPLE-FOREST, SHRUB-CARR, and RR rights-of-way.

Sambucus racemosa L. **Hanes:** *S. pubens*
Red-berried Elder; Red Elderberry
Occasional. Moist terrestrial forests.

Symphoricarpos albus (L.) S. F. Blake **Hanes:** *S. rivularis*
Snowberry
Current status uncertain. Roadsides through terrestrial forest, TERRESTRIAL-PRAIRIE, disturbed SUGAR-MAPLE-FOREST, and OAK-HARDWOOD-FOREST. The introduced var. *laevigatus* and the native var. *albus* both occur here.

Symphoricarpos orbiculatus Moench
Coralberry
Current status uncertain. RR rights-of-way and roadsides. Not native.

Triosteum aurantiacum E. P. Bicknell
Feverwort
Occasional. OAK-HARDWOOD-FOREST and SUGAR-MAPLE-FOREST.

Triosteum perfoliatum L.
Wild Coffee; Horse Gentian
Occasional. Rich OAK-HARDWOOD-FOREST. Probably once occurred in oak savanna.

Viburnum acerifolium L.
Maple-leaved Viburnum
Occasional. Rich HARDWOOD-SWAMP, RED-MAPLE-SWAMP, SUGAR-MAPLE-FOREST, and OAK-HARDWOOD-FOREST.

Viburnum dentatum L.
Arrow-wood
Current status unknown. First reported by Elliott (1960); "common member of natural shrub border on road-cut, N of main campus, [MSU] Biological Station." The most recent report is a collection made by M. McCann on 1 June 1976 from section 30 of Kalamazoo Tp. at Little Asylum Lake "edge of marsh N of Lake, single 2 m tall bush." Not native. Not in Hanes & Hanes (1947).

Viburnum lentago L.
Nannyberry
Occasional. FEN, TAMARACK-SWAMP, RED-MAPLE-SWAMP, and WET-MEADOW. Usually near lakes and streams.

Viburnum opulus L. **Hanes:** *V. trilobum*
Highbush-cranberry; Guelder-rose
Occasional. FEN, WET-MEADOW, and openings in RED-MAPLE-SWAMP. Generally found in open forest and wetlands near lakes, streams, and the Kalamazoo River.

Viburnum prunifolium L.
Black-haw
Rare. Collected by the Haneses from SUGAR-MAPLE-FOREST and HARDWOOD-SWAMP. Reported from the Augusta Floodplain Forest Preserve in SUGAR-MAPLE-FOREST on levees in an area otherwise dominated by FLOODPLAIN-FOREST (Meagher & Tonsor 1992). Difficult to discern from *V. lentago*.

Viburnum rafinesquianum Schultes **Hanes:** *V. affine*
Downy Arrow-wood
Occasional. Rich SUGAR-MAPLE-FOREST and OAK-HARDWOOD-FOREST.

VALERIANACEAE **Valerian Family**

Valeriana edulis T. & G. **Hanes:** *V. ciliata*
Edible Valerian
Current status uncertain, very rare if still extant. Collected by the Haneses from FEN on the E side of Paw Paw Lake. Reported without a specimen from FEN at Butterfield Lake (MNFI EO record).

Valeriana officinalis L.
Common Valerian; Garden-heliotrope
Current status unknown. Collected only by the Haneses on 13 June 1945 from a disturbed HARDWOOD-SWAMP SW of Fulton. Not native. Not in Hanes & Hanes (1947).

Valeriana uliginosa (T. & G.) Rydb.
Swamp Valerian
Occasional in FEN.

Valerianella chenopodiifolia (Pursh) DC. **Hanes:** *Valerianella chenopodifolia*
Goosefoot Corn Salad
Current status uncertain, very rare if still extant. Collected by the Haneses from FLOODPLAIN-FOREST near the Kalamazoo River 2½ mi. E of Galesburg where it was apparently associated with *Chaerophyllum procumbens*.

DIPSACACEAE **Teasel Family**

Dipsacus fullonum L. **Hanes:** *D. sylvestris*
Wild Teasel
First reported (but without a specimen) from Kalamazoo County on 26 September 1903 from pasture in Prairie Ronde Tp. (Burgess notes, see *Linum usitatissimum*). Apparently uncommon with the Haneses, but now common throughout along roadsides, in old fields, and in other open disturbed situations. Widely established.

Dipsacus laciniatus L.
Cut-leaf Teasel
Current status unknown. First collected by L. West and W. H. Wagner Jr. from along EF Ave. in section 25 of Cooper Tp. on 1 August 1973. Label reads “one huge plant over 5 ft. tall growing along weedy, shaded roadside” (MICH). Not native. Not in Hanes & Hanes (1947).

CUCURBITACEAE **Gourd Family**

Echinocystis lobata (Michaux) T. & G.
Wild-cucumber
Common. Lakeshores, SHRUB-SWAMP, FEN, SHRUB-CARR, WET-MEADOW, and swampy forests of all kinds.

CAMPANULACEAE **Bellflower Family**

Campanula americana L.
Tall or American Bellflower
Occasional. SUGAR-MAPLE-FOREST and OAK-HARDWOOD-FOREST.

Campanula aparinoides Pursh
Marsh Bellflower
Occasional. FEN and WET-MEADOW. A calciphile, usually found near streams and lakeshores in sedge meadow, especially where marl is close to the surface. We have two vars. here; var. *aparinoides* with relatively small flowers (apparently limited to the W½ of the county), and var. *grandiflora* (the Haneses' *C. uliginosa*) with slightly larger flowers (more frequent and abundant throughout).

Campanula persicifolia L.
Willow Bellflower
Mapped by Voss (1996). Not in Hanes & Hanes (1947). Not native.

Campanula rapunculoides L.
Roving or Creeping Bellflower
Current status unknown. Roadsides and lawns. Not native.

Campanula rotundifolia L.
Bluebell; Harebell
Occasional. Hilly and open lakeside or streamside OAK-HARDWOOD-FOREST and hillside prairie.

Lobelia cardinalis L.
Red Lobelia; Cardinal Flower
Occasional. Thinly wooded HARDWOOD-SWAMP, FLOODPLAIN-FOREST, roadside ditches, and WET-MEADOW, especially near the Kalamazoo River.

Lobelia inflata L.
Indian-tobacco
Rare. Moist sandy old fields and OAK-HARDWOOD-FOREST.

Lobelia kalmii L.
Kalm's or Brook Lobelia
Common. FEN, WET-MEADOW, and other alkaline (often marly) lakeshores.

Lobelia siphilitica L.
Great Blue Lobelia
Occasional. FEN, WET-MEADOW, COASTAL-PLAIN-MARSH, WET-PRAIRIE, and other open and sandy moist to wet situations.

Lobelia spicata Lam.
Pale Spiked Lobelia
Rare. Moist situations alongside streams and other wetlands, usually in sandy soil.

Triodanis perfoliata (L.) Nieuwl. **Hanes:** *Specularia perfoliata*
Venus' Looking-glass
Rare. Oak savanna and TERRESTRIAL-PRAIRIE.

COMPOSITAE (ASTERACEAE) **Aster or Daisy Family**

Several species are reported here based only upon annotations made by E. G. Voss and mapped in his treatment of this family for Volume III of The Michigan Flora, (1996). *Solidago sempervirens* L. Seaside Goldenrod, probably occurs in Kalamazoo County but is not listed below. I observed a single individual of what appeared to be this species growing in a gap in a cement barrier in the expressway

median of I-94, approximately 100 meters W of the 9th St. exit ramp in September 1999. This plant was not collected, but through my car window (I was stuck in traffic) I could see that it had the rather succulent, entire leaves, among other features characteristic of this species. *Helianthus grosseserratus* M. Martens should be expected to occur in Kalamazoo County, but I have seen no plants or herbarium specimen(s). It should be looked for in open wetlands.

Achillea millefolium L.
Yarrow; Milfoil
Common. RR rights-of-way, roadsides, old fields, and other open disturbed situations. Includes the Haneses' (1947) *A. asplenifolia*. Both native and introduced plants probably occur here (Voss 1996).

Ambrosia artemisiifolia L. **Hanes:** *A. elatior*
Common Ragweed
Common in a diversity of open disturbed situations.

Ambrosia psilostachya DC. **Hanes:** *A. coronopifolia*
Western Ragweed
Current status unknown. Collected by the Haneses from a RR right-of-way W of Schoolcraft, and along this same RR right-of-way in section 36 of Charleston Tp. Not native.

Ambrosia trifida L.
Giant Ragweed
Common. Moist thickets, forest edges, RR rights-of-way, old fields, and roadsides.

Anaphalis margaritacea (L.) Bentham
Pearly Everlasting
Occasional at OAK-HARDWOOD-FOREST edges, in WET-PRAIRIE, and in open dry old fields.

Antennaria howellii Greene **Hanes:** *A. neodioica* & *A. petaloidea*
Occasional in a diversity of relatively open, dry, sandy situations.

Antennaria neglecta Greene
Pussytoes
Occasional. Dry old fields and RR rights-of-way.

Antennaria parlinii Fernald
Parlin's Pussytoes
Occasional. Dry wooded hillsides in OAK-HARDWOOD-FOREST and hillside prairie. The Haneses' (1947) *A. fallax, A. munda,* & *A. plantaginifolia* can probably be referred here.

Anthemis arvensis L.
Corn Chamomile
Occasional? Open disturbed situations such as roadsides and lawns. Not native.

Anthemis cotula L.
Mayweed; Dog-fennel; Stinking Chamomile
Occasional? Old fields and similar weedy open habitats. Not native.

Anthemis tinctoria L.
Yellow Chamomile; Golden Marguerite
Collected by the Haneses from a "roadside" in section 15 of Texas Tp."W of Bass Lake" (MICH). Not native. Not in Hanes & Hanes (1947).

Arctium minus Bernh.
Common Burdock
Common. Disturbed ground including roadsides, old fields, RR rights-of-way, and wood edges. Widely established.

Arnoglossum atriplicifolium (L.) H. Rob. *Cacalia atriplicifolia* L. in Hanes & Hanes, 1947.
Pale Indian Plantain
Collected by the Haneses from OAK-HARDWOOD-FOREST, WET-PRAIRIE, TERRESTRIAL-PRAIRIE, BUR-OAK-SAVANNA, and WHITE-OAK-SAVANNA. *Arnoglossum atriplicifolium* can be a good indicator of potentially recoverable oak savanna when found in association with other prairie and/or savanna plants. This species has declined considerably in recent years due to succession in oak savannas, and development (pers. obs., R. W. Pippen pers. comm.) (Athey & Pippen 1987).

Arnoglossum plantagineum (Raf.) *Cacalia tuberosa* in Hanes & Hanes, 1947.
Tuberous Indian Plantain
Occasional. Wet FEN sedge meadows associated with *Platanthera dilatata, Calopogon tuberosus*, *Triglochin maritimum,* and *Menyanthes trifoliata*. At one site protected by the Michigan Nature Association, thousands of plants grow in a near monoculture in a very wet marly FEN sedge meadow (Figure 10).

Artemisia abrotanum L.
Southernwood
Current status unknown. Collected by the Haneses from "roadsides near Eagle Lake", and from section 33 of Texas Tp. Not native.

Artemisia absinthium L.
Absinth; Common Wormwood
Occasional? Open sandy disturbed situations. Not native.

Artemisia biennis Willd.
Biennial Wormwood
Current status unknown. Collected by the Haneses from a roadside on "Island No. 4" in the Kalamazoo River (Cooper Tp.). Not native.

Artemisia campestris L. **Hanes:** *A. caudata*
Wild Wormwood
Occasional. Roadsides, RR rights-of-way, and BLACK-OAK-BARREN.

Artemisia ludoviciana Nutt.
Western Mugwort
Current status unknown. Mapped by Voss (1996). Possibly adventive. Not in Hanes & Hanes (1947).

Artemisia pontica L.
Roman Wormwood
Current status unknown. Roadsides. Not native. Not in Hanes & Hanes (1947).

Aster borealis (T. & G.) Prov. **Hanes:** *A. junciformis*
Rush Aster
Occasional. FEN and WET-MEADOW.

Aster cordifolius L.
Heart-leaved or Blue Wood Aster
Rare. Rich SUGAR-MAPLE-FOREST, HARDWOOD-SWAMP, and FLOODPLAIN-FOREST, mostly in the N½ of the county. Includes the Haneses' (1947) *A. finkii*.

Aster dumosus L.
Bushy Aster
Occasional. Sandy soil of BLACK-OAK-BARREN and COASTAL-PLAIN-MARSH. Typically found near sandy lakeshores, and most frequent in the W½ of the county. Apparently once relatively common, but now at best occasional due to habitat loss along sandy lakeshores.

Aster ericoides L.
Rare. Collected by the Haneses from several roadsides, fencerows, and RR rights-of-way through former TERRESTRIAL-PRAIRIE on Prairie Ronde. Also known from WHITE-OAK-SAVANNA along a RR right-of-way near Richland.

Aster laevis L.
Smooth Aster
Occasional. Old fields, roadsides and RR rights-of-way through TERRESTRIAL-PRAIRIE, in BLACK-OAK-BARREN, and on relatively open hillsides in OAK-HARDWOOD-FOREST. Includes the Haneses' (1947) *A. lowrieanus*.

A hybrid is known from Kalamazoo County between *A. laevis* and *A. lanceolatus* that the Haneses (1947) called *A. concinnus*.

Aster lanceolatus Willd. **Hanes:** *A. paniculatus* & *A. interior*
Panicled Aster
Occasional in a diversity of moist to wet, open to lightly shaded situations. Many specimens are difficult to place, probably owing to hybridization with other *Aster* spp.

Aster lateriflorus (L.) Britton
Calico Aster
Rare? Roadsides through HARDWOOD-SWAMP, RED-MAPLE-SWAMP, rich SUGAR-MAPLE-FOREST, and TAMARACK-SWAMP.

Aster macrophyllus L.
Large- or Big-leaved Aster
Occasional. OAK-HARDWOOD-FOREST, often on hillsides, and in former hillside prairie.

Aster novae-angliae L.
New England Aster
Common. Roadsides, WET-PRAIRIE, TERRESTRIAL-PRAIRIE, FEN, and WET-MEADOW.

Aster ontarionis Wiegand **Hanes:** *A. pantotrichus*
Lake Ontario Aster
Current status uncertain. Clearly very rare if still extant. Collected by the Haneses and only from "Crane Town near the swamp along Flowerfield Creek," and from "Smith apple orchard, west of Schoolcraft."

Aster oolentangiensis Riddell **Hanes:** *A. azureus*
Sky-blue Aster
Occasional. Dry sandy soil in areas once occupied by BLACK-OAK-BARREN and WHITE-OAK-SAVANNA.

Aster paternus Cronquist.
White-topped Aster
Extinct. Collected only once in our county (and state), on 31 August 1918 in "dry ground" at Galesburg by O. A. Farwell (*Farwell 5097a,* GH) (Farwell 1923). Possibly introduced from S of Michigan. Not in Hanes & Hanes (1947).

Aster pilosus Willd.
Frost Aster
Rare on roadsides through former TERRESTRIAL-PRAIRIE, mostly in the SW¼ of the county. No longer known from most other parts of the county. Once apparently rare throughout in oak savanna, but not recently observed or collected from remnant savanna.

Aster praealtus Poiret
Willow Aster
Current status uncertain, very rare if still extant. Known from only one collection made by C. R. Hanes on 11 September 1936 at Spring Brook (Cooper Tp.). Not in Hanes & Hanes (1947).

Aster puniceus L.
Swamp or Purple-stemmed Aster
Occasional. FEN, WET-MEADOW, SHRUB-CARR, WET-PRAIRIE, and TERRESTRIAL-PRAIRIE. Includes the Haneses' (1947) *A. lucidulus* and *A. firmus*.

Aster sagittifolius Willd.
Arrow-leaved Aster
Occasional. Relatively open, well-drained SUGAR-MAPLE-FOREST, and OAK-HARDWOOD-FOREST. The Haneses' *A. drummondii* is included here as scarcely distinct from this species (Voss 1996).

Aster sericeus Vent.
Silky Aster
Extinct. Collected by the Haneses from roadsides and RR rights-of-way through former TERRESTRIAL-PRAIRIE, and from a hillside prairie on the E bank of Pretty Lake. Now extinct at all previously known sites despite extensive searches made by multiple investigators over many years. Last seen (but not collected) by R. Brewer in 1965 along a RR right-of-way S of XY Avenue in Schoolcraft. This site has since been partly bulldozed.

Aster shortii Lindley
Short's Aster
Current status uncertain, very rare if still extant. Collected by the Haneses from "the H. R. Becker woods" and from "hilly woodlands" in section 30 (both Charleston Tp.).

Aster umbellatus Miller
Flat-topped Aster
Occasional. FEN, WET-MEADOW, WET-PRAIRIE, and roadsides and RR rights-of-way through former TERRESTRIAL-PRAIRIE.

Bellis perennis L.
English Daisy
Occasional. Lawns. Locally established.

Bidens cernuus L. **Hanes:** *B. cernua*
Nodding Beggar-ticks
Occasional. BOG, FEN, WET-PRAIRIE, WET-MEADOW, EM-MARSH, roadside ditches, and other wet situations.

Bidens comosus (A. Gray) Wiegand. **Hanes:** *B. comosa*
Leafy-bracted Bur Marigold
Occasional in a diversity of open wet situations.

Bidens connatus Willd. **Hanes:** *B. connata*
Purple-stemmed Bur Marigold
Occasional in the W½ of the county on sandy lakeshores, often in COASTAL-PLAIN- MARSH.

Bidens coronatus (L.) Britton **Hanes:** *B. coronata*
Tickseed-sunflower
Common. FEN, BOG, WET-MEADOW, EM-MARSH, and WET-PRAIRIE.

Bidens discoideus (T. & G.) Britton **Hanes:** *B. discoidea*
Small Beggarticks
Current status uncertain. Mostly in the S½ of the county in mud on lakeshores.

Bidens frondosus L. **Hanes:** *B. frondosa*
Beggarticks
Occasional. Lawns, roadsides, and almost anywhere else with some direct sun and relatively moist soil.

Bidens vulgatus Greene **Hanes:** *B. vulgata*
Common Beggarticks
Occasional. Lawns and other disturbed, wet situations including ditches and RR rights-of-way.

Carduus acanthoides L. **Hanes:** *Carduus crispus*
Reports of *Carduus crispus* L., (Plumeless Thistle), from Kalamazoo County seem to be mis-identifications of this species (see Voss 1996). Known only from a collection made by the Haneses on 24 June 1936 from a pasture field at Coopers Glen. Not native.

Centaurea cyanus L.
Bachelor's-button; Cornflower
Current status unknown. Collected by the Haneses from two locations in section 16 of Ross Tp. Not native.

Centaurea diffusa Lam.
White-flowered or Tumble Knapweed
Current status unknown. First collected in Michigan in 1943 on the S boundary of Section 35 Richland Tp. (Hanes 1945b; Voss 1996). Not native.

Centaurea jacea L.
Brown Knapweed
Current status unknown. Collected by the Haneses from a roadside in Section 29 Texas Tp. Not native. Includes the Haneses (1947) *C. nigra*.

Centaurea ×*pratensis* (*C. jacea* × *C. nigra*) is a rare introduction collected by the Haneses in Alamo Tp. Current status unknown.

Centaurea maculosa Lam.
Spotted Knapweed
Common. Dry open disturbed situations. A mild calciphile (R. Brewer pers. comm. 2001). Widely established.

Centaurea repens L. **Hanes:** *C. picris*
Russian Knapweed
Current status unknown. The most recent Michigan collection was made in 1946 by the Haneses from "the Grand Trunk railway 1 mi. W of Schoolcraft" (Hanes 1938; Voss 1996). Not native.

Chondrilla juncea L**.**
Skeleton-weed
First collected in the county (and the state) in 1934 near West Lake. Now occasional throughout in open sandy situations, especially in Alamo Tp. Not native.

Chrysanthemum balsamita L.
Costmary; Mint-geranium
Current status unknown. Known from open disturbed situations. Not native.

Chrysanthemum leucanthemum L.
Ox-eye Daisy
Common in open disturbed situations including roadsides, RR rights-of-way, and old fields. Not native.

Cichorium intybus L.
Chickory; Blue-sailors
Common. Roadsides, RR rights-of-way, fencerows, and lawns. Widely established.

Cirsium altissimum (L.) Sprengel
Tall Thistle
Occasional. Often found at the interface of OAK-HARDWOOD-FOREST with FEN or BOG. Probably once occurred in moist oak savanna.

Cirsium arvense (L.) Scop.
Canada or Field Thistle
Common in a diversity of open situations, especially moist old fields. Widely established.

Cirsium discolor (Willd.) Sprengel
Pasture Thistle
Occasional. Mostly in the SW¼ of the county along RR rights-of-way, on roadsides, in FEN, WET-PRAIRIE, WHITE-OAK-SAVANNA, and TERRESTRIAL-PRAIRIE.

Cirsium hillii (Canby) Fernald
Hill's Thistle
Very rare. Collected by the Haneses from a RR right-of-way S of Portage, roadsides through former TERRESTRIAL-PRAIRIE near Schoolcraft, in Harrison Cemetery NW of Schoolcraft (unplowed TERRESTRIAL-PRAIRIE), and a cemetery in section 34 of Portage Tp. Reported in the collection notes of Burgess (see *Linum usitatissimum*) from "railroad banks" in Portage (BUR-OAK-SAVANNA/WHITE-OAK-SAVANNA) on 17 June 1903. Hill's Thistle may have been associated with *Amorpha canescens*, *Anemone cylindrica, Asclepias purpurascens, Galium boreale, Helianthemum virginianum, Lupinus perennis, Rosa carolina, Rudbeckia hirta, Smilacina racemosa, Tephrosia virginiana*, and other TERRESTRIAL-PRAIRIE and oak savanna plants noted in a ledger of specimens that he collected at this site. Collected by C. N. Harvey 6 July 1939 from a meadow along the "Fruit Belt Line". Collected by L. A. Kenoyer from grassland associated with the "old railway near campus" [the former MI Central RR right-of-way near the WMU campus] in 1931. A rosette was seen in 2002 in overgrown TERRESTRIAL-PRAIRIE/WHITE-OAK-SAVANNA along the former MI Central RR right-of-way W of Stadium Drive Apartments near Stadium Dr. (more or less across from K-mart). This is the same former right-of-way where the Harvey and Kenoyer collections were made. The plant was growing in a very small opening along the former right-of-way in dry-mesic loamy sand. Immediate associates included *Andropogon gerardii, Carex pensylvanica, Prunus serotina,* and *Quercus alba*. This once open site is now nearly covered with trees and shrubs. This is another of our nearly extinct, formerly somewhat common prairie/savanna plants.

Cirsium muticum Michaux
Swamp Thistle
Occasional. FEN, WET-PRAIRIE, WET-MEADOW, and quite generally along lakeshores throughout.

Cirsium vulgare (Savi) Tenore
Bull Thistle
Common. Pastures, roadsides, RR rights-of-way, and other open disturbed situations. Widely established.

Conyza canadensis (L.) Cronquist **Hanes:** *Erigeron canadensis*
Horseweed
Common in a diversity of open situations. Probably most abundant in the first or second year of old field succession, especially in cornfields (R. Brewer pers. comm. 2001).

Coreopsis grandiflora Sweet
Big Coreopsis
Current status unknown. Known by the Haneses from a single colony along a RR right-of-way 6 mi. W of Schoolcraft (Hanes 1938). Not native.

Coreopsis lanceolata L.
Lance Tickseed
Collected by the Haneses from sandy oak savanna in the south-central part of the county. Now occa-

sional throughout along dry roadsides, and in prairie plantings. Probably at least in part adventive/escaped here. Cultivated plants readily spread to nearby dry roadsides.

Coreopsis palmata Nutt.
Finger or Prairie Coreopsis
Very rare. Collected by the Haneses from the SW¼ of the county at the edge of "oak woods and thickets", and along RR rights-of-way on Prairie Ronde in former TERRESTRIAL-PRAIRIE, BUR-OAK-SAVANNA, and WHITE-OAK-SAVANNA. Now rare in sandy oak savanna at the Hampton Creek Consumer's Power right-of-way, and as a relict of former TERRESTRIAL-PRAIRIE and WHITE-OAK-SAVANNA in a few other locations. Most of the very few remaining plants occur in overgrown oak savanna near the intersection of Centre St. and US 131. Occasionally cultivated. Collected in 1838 on Gull Prairie by the first botanical survey. Probably once modal in blacksoil TERRESTRIAL-PRAIRIE and adjacent oak savannas. Nearly extinct.

Coreopsis tinctoria Nutt. **Hanes:** *Thelesperma trifidum*
Plains Coreopsis; Calliopsis
Current status unknown. Collected by the Haneses along a RR right-of-way W of Schoolcraft. Adventive.

Coreopsis tripteris L.
Tall Tickseed; Tall Coreopsis
Occasional. BLACK-OAK-BARREN, WHITE-OAK-SAVANNA, BUR-OAK-SAVANNA, TERRESTRIAL-PRAIRIE, and WET-PRAIRIE. A persistent prairie and oak savanna generalist.

Cosmos bipinnatus Cav.
Current status unknown. Collected by the Haneses 25 September 1935 from "waste places" in Pavilion Tp. (MICH). An escape from cultivation.

Cosmos sulphureus Cav.
Collected in 1942 from along a roadside W of Schoolcraft by the Haneses. No longer known.

Crepis capillaris (L.) Wallr.
Smooth Hawk's-beard
Current status unknown. Collected by the Haneses from the S½ of the county in lawns. Not native.

Echinacea pallida (Nutt.) Nutt. **Hanes:** *Brauneria pallida*
Pale-purple Coneflower
Extinct. Collected by the Haneses from along a RR right-of-way W of Indian Lake, and "near Camp Custer." May not be native here.

Echinacea purpurea (L.) Moench
Collected by the first botanical survey in 1838 on Gull Prairie (Richland Tp.) and thought to be native. Now extinct as a native plant, but appearing occasionally along expressways and in other roadside situations, probably from seed spread by cultivated plants. Widely planted. Not in Hanes & Hanes (1947).

Echinops sphaerocephalus L.
Globe-thistle
Collected by the Haneses from along a roadside in Kalamazoo Tp. on 8 August 1936. No longer known. Not native. Not in Hanes & Hanes (1947).

Erechtites hieraciifolia (L.) DC.
Fireweed
Occasional. Moist lawns, old fields, and other disturbed situations.

Erigeron annuus (L.) Pers.
Daisy Fleabane
Common. Roadsides, RR rights-of-way, and old fields.

Erigeron philadelphicus L.
Common or Philadelphia Fleabane
Occasional in forests.

Erigeron pulchellus Michaux
Robin's-plantain
Current status uncertain, very rare if still extant. Dry OAK-HARDWOOD-FOREST. Probably once also occurred in oak savanna.

Erigeron strigosus Willd.
Daisy Fleabane
Occasional. RR rights-of-way and other open disturbed situations.

Eupatorium altissimum L.
Tall Boneset
Current status unknown. First collected by S. R. Crispin on 29 August 1979 from the NW¼ NW¼ of section 21 of Schoolcraft Tp. ca. ¼ mi. E of 16th St. where it was "rare on open right-of-way on N side of GTW RR" (MSC). Adventive. Not in Hanes & Hanes (1947).

Eupatorium maculatum L.
Joe-pye-weed
Common. FEN, WET-MEADOW, WET-PRAIRIE, and old fields.

Eupatorium perfoliatum L.
Boneset
Common. FEN, SHRUB-CARR, COASTAL-PLAIN-MARSH, and WET-PRAIRIE.

Eupatorium purpureum L.
Green-stemmed Joe-pye-weed
Occasional in rich upland forest.

Eupatorium rugosum Houtt.
White Snakeroot
Occasional. SUGAR-MAPLE-FOREST, HARDWOOD-SWAMP, and FLOODPLAIN-FOREST.

Eupatorium sessilifolium L.
Upland Boneset
Extinct. Known only from collections made by the Haneses from thinly wooded ridges in Charleston Tp. Today the area is closed canopy OAK-HARDWOOD-FOREST.

Euthamia graminifolia (L.) Nutt. **Hanes:** *Solidago graminifolia*
Flat-topped, Bushy, or Grass-leaved Goldenrod
Common. A diversity of open, moist to wet situations, often near lakeshores.

Euthamia remota Greene **Hanes:** *Solidago graminifolia* var. *remota*
Occasional. Usually in wet peaty sand near seepage areas, and in COASTAL-PLAIN-MARSH in the W½ of the county (Hanes 1945a). Persists at many former/current sites for COASTAL-PLAIN-MARSH.

Gaillardia pulchella Foug. **Hanes:** *G. aristata*
Great-flowered Gaillardia
Current status unknown. Collected by the Haneses from roadsides, a ditch, and near Stony Lake. Not native.

Galinsoga parviflora Cav.
Current status uncertain. Moist lawns and roadsides. Not native. Not in Hanes & Hanes (1947).

Galinsoga quadriradiata Cav. **Hanes:** *G. ciliata*
Quickweed
Current status uncertain. Moist lawns and roadsides. Not native.

Gnaphalium macounii Greene
Clammy Cudweed
Current status unknown. BLACK-OAK-BARREN and openings in OAK-HARDWOOD-FOREST.

Gnaphalium obtusifolium L.
Fragrant Cudweed
Occasional. Dry old fields and disturbed BLACK-OAK-BARREN.

Gnaphalium purpureum L.
Purple Cudweed
Current status unknown. Collected by the Haneses from sandy old fields. Not native.

Gnaphalium uliginosum L.
Low Cudweed
Current status uncertain. Known from moist soil in roadside ditches and pond edges. Not native.

Grindelia squarrosa (Pursh) Dunal
Gumweed
Extinct. Collected by the Haneses from roadsides and fencerows, mostly, if not entirely on former prairies. Last collected by R. Brewer in the early 1960s from a fencerow in former TERRESTRIAL-PRAIRIE near Stadium Dr. This site was later destroyed by road construction (see *Eryngium yuccifolium*). No recent collections or reports are known, and no previous sites still hold this species, possibly adventive.

Guizotia abyssinica (L. f.) Cass.
Niger-seed
Current status unknown. Collected in 1976 from a parking lot in Richland by Gillis (*13473* MSC). Not native. Not in Hanes & Hanes (1947).

Helenium autumnale L.
Common Sneezeweed
Current status unknown. Collected by the Haneses from a RR right-of-way E of Schoolcraft and from a "swamp" along the Kalamazoo River E of Comstock.

Helenium flexuosum Raf. **Hanes:** *H. nudiflorum*
Purple-headed Sneezeweed
Current status unknown. Known only from a specimen collected near Camp Custer by H. R. Becker (Hermann 1936). Not native.

Helianthus annuus L.
Common Sunflower
An occasional escape from cultivation throughout the county along roadsides and RR rights-of-way.

Helianthus decapetalus L.
Thin-leaved Sunflower
Occasional. Open swampy forests and along roadsides through former WET-PRAIRIE.

Helianthus divaricatus L.
Woodland Sunflower
Common. BLACK-OAK-BARREN, OAK-HARDWOOD-FOREST (especially edges), and along dry RR rights-of-way and roadsides.

The hybrid *Helianthus ×ambiguus* (*H. divaricatus* × *H. giganteus*) has been collected in Kalamazoo county.

Helianthus giganteus L.
Tall Sunflower
Occasional. FEN, WET-PRAIRIE, WET-MEADOW, and roadside ditches. Known to hybridize with *H. divaricatus* forming the named hybrid *Helianthus ×ambiguus* (see *H. divaricatus*).

Helianthus hirsutus Raf.
Hairy Sunflower
Current status uncertain, very rare if still extant. Collected by the Haneses on 13 July 1937, 1 mi. W of Vicksburg along a RR right-of-way in sandy soil. No other collections are known. Not in Hanes & Hanes (1947).

Helianthus maximilianii Schrader
Maximilian Sunflower
Extinct. Collected by the Haneses from a RR right-of-way in Schoolcraft where it had in 1943 "persisted for many years." No longer known. Possibly adventive.

Helianthus mollis Lam.
Ashy or Downy Sunflower
Very rare. Collected by the Haneses from a RR right-of-way SW of Schoolcraft, and more recently (1994) by P. Higman (MNFI) from savanna-like openings in Fort Custer.

Helianthus occidentalis Riddell
Western Sunflower
Rare as a relict of TERRESTRIAL-PRAIRIE, and oak savanna throughout. A good indicator of quality remnant oak savanna and prairie when found in association with other typical prairie/savanna species.

Helianthus pauciflorus Nutt. **Hanes:** *H. rigidus*
Prairie Sunflower
Rare. RR rights-of-way through former TERRESTRIAL-PRAIRIE in the S½ of the county.

The hybrid *Helianthus ×laetiflorus* (*H. pauciflorus* × *H. tuberosus*) has been collected in Kalamazoo County.

Helianthus petiolaris Nutt.
Plains Sunflower
Extinct. Known only from a Hanes collection 1 mi. E of Schoolcraft along a RR right-of-way. No longer known. Possibly adventive.

Helianthus strumosus L.
Pale-leaved Sunflower
Rare. RR rights-of-way, roadsides, fencerows, TERRESTRIAL-PRAIRIE, BUR-OAK-SAVANNA, and WHITE-OAK-SAVANNA, mostly in the SW¼ of the county.

Helianthus tuberosus L.
Jerusalem-artichoke
Occasional. Mostly in the SW¼ of the county, and especially in fencerows and along roadsides and RR rights-of-way. Especially frequent on Prairie Ronde and Gourdneck Prairie. This was a popular natural food in the 1960s and was widely planted for human consumption. It was also probably cultivated by Native Americans (R. Brewer pers. comm.). Known to hybridize with *H. pauciflorus* forming the named hybrid *Helianthus ×laetiflorus* (see *H. pauciflorus*).

Heliopsis helianthoides (L.) Sweet
False Sunflower
Occasional. RR rights-of-way, roadsides, and fencerows. Especially frequent in the vicinity of Prairie Ronde and Gourdneck Prairie.

Hieracium aurantiacum L.
Orange Hawkweed; Devil's-paintbrush
Common. Dry open disturbed situations including lawns, roadsides, and RR rights-of-way. Not native.

Hieracium caespitosum Dumort
King Devil; Yellow Hawkweed
Occasional. Disturbed situations along roadsides, in lawns, and in old fields. Not native. Not in Hanes & Hanes (1947).

Hieracium gronovii L.
Hairy Hawkweed
Occasional. Mostly in the W½ of the county in OAK-HARDWOOD-FOREST, old fields, and sandy former BLACK-OAK-BARREN.

Hieracium kalmii L. **Hanes:** *H. canadense*
Canada Hawkweed
Current status uncertain. Relatively dry sandy situations along RR rights-of-way and at OAK-HARDWOOD-FOREST edges.

Hieracium longipilum Hooker
Prairie or Long-bearded Hawkweed
Current status uncertain. Dry, sandy soil along RR rights-of-way, and in old fields.

Hieracium paniculatum L.
Current status uncertain. Similar situations as *H. kalmii* (sandy situations along RR rights-of-way and OAK-HARDWOOD-FOREST edges), but not usually as dry. Not in Hanes & Hanes (1947).

Hieracium piloselloides Vill.
King Devil; Yellow Hawkweed
Current status unknown. First collected by R. W. Pippen 12 June 1969 from ½ mi. S of the intersection of Center St. and US 131 in the Gourdneck State Game Area. Here it was frequent in dry open old fields. Not native. Not in Hanes & Hanes (1947).

Hieracium scabrum Michaux
Rough Hawkweed
Current status uncertain. Hilly OAK-HARDWOOD-FOREST and old fields.

Hieracium venosum L.
Rattlesnake-weed; Veined Hawkweed
Current status uncertain, very rare if still extant. Collected only by the Haneses in an "oak wood" in section 24 of Cooper Tp.

Hypochaeris radicata L.
Cat's-ear
First collected 1 July 1938 by the Haneses from a Schoolcraft yard. Now occasional throughout. Like the Hawkweeds, does well in dry lawns and old fields. Not native.

Inula helenium L.
Elecampane
Current status uncertain. Usually near roadways. Not native.

Iva xanthifolia Nutt.
Marsh Elder
Current status unknown. Collected by the Haneses from roadsides. Not native.

Krigia biflora (Walter) S. F. Blake
Cynthia
Rare. Oak savanna and TERRESTRIAL-PRAIRIE. A good indicator of former savanna/prairie.

Krigia virginica (L.) Willd.
Dwarf Dandelion
Rare. BLACK-OAK-BARREN and OAK-HARDWOOD-FOREST.

Kuhnia eupatorioides L.
False Boneset
Very rare. Once occasional along roadsides, RR rights-of-way, in fencerows, and in remnant WHITE-OAK-SAVANNA, TERRESTRIAL-PRAIRIE, and BLACK-OAK-BARREN. This species is now nearly extinct.

Lactuca biennis (Moench) Fernald
Tall Blue Lettuce
Occasional. At wood edges and openings in HARDWOOD-SWAMP and RED-MAPLE-SWAMP.

Lactuca canadensis L.
Wild Lettuce
Occasional in a diversity of open disturbed situations.

Lactuca saligna L.
Willow-leaved Lettuce
Current status unknown. Only known collection was made by P. J. Higman in 1993 from a dry, weedy roadside depression on the E side of Longman Rd. approximately .4 mi. N of I-94 in section 24 of Charleston Tp. (MICH). Not native. Not in Hanes & Hanes (1947).

Lactuca serriola L. **Hanes:** *L. scariola*
Prickly Lettuce
Common. Open disturbed areas, especially construction sites, weedy lawns, and roadsides. Not native.

Lapsana communis L.
Nipplewort
Occasional in open disturbed situations. Not native. Not in Hanes & Hanes (1947).

Liatris aspera Michaux **Hanes:** *L. sphaeroidea*
Blazing Star
Rare. Relatively dry and sandy WHITE-OAK-SAVANNA (including hillside prairies), TERRESTRIAL-PRAIRIE, BLACK-OAK-BARREN, and open OAK-HARDWOOD-FOREST, mostly in the W½ of the county. Probably once modal in BLACK-OAK-BARREN. Shrub growth, canopy closure, and other habitat destruction have led to the relatively rapid decline of this once common species. Perhaps the largest remaining colony persists in oak savanna and old fields along the old Fruit Belt RR approximately 500m NW of the intersection of O Ave. and 4th St. The area was surveyed for a new subdivision in 2002, and a large area had been bulldozed on a slightly later trip I made to the site. I encountered an albino plant here (f. *benkei*) in fall 2002. The Haneses report this albino forma from a former site E of Sugarloaf Lake.

Liatris cylindracea Michaux
Cylindric Blazing Star
Very rare. Collected by the Haneses from very dry, open, and sandy situations in former BLACK-OAK-BARREN in the W½ of the county. Once occasional, but now nearly extinct. The last large

population that I know (in the Gourdneck State Game Area) has declined significantly over the last 30+ years (R. W. Pippen pers. comm.). Probably once modal in open sandy BLACK-OAK-BARREN.

Liatris punctata Hooker
Dotted Button Snakeroot
Extinct. Two plants were long known by the Haneses from along a roadside on Prairie Ronde. In Florence Haneses diary she mentions that she and Clarence intended to photograph the plants before digging one up and planting it in their home garden for closer study. It is unclear if they ever dug one of the plants. In 1936 the Haneses noted that the plants were known at this site for at least 30 yrs. Road widening and mowing may have destroyed these plants which were last seen in 1953 (Hanes diary). This site was located ½–¾ mi. NE of Schoolcraft along the roadside and the plants may have been associated with *Silphium integrifolium* and other prairie plants collected by the Haneses in this general area (see Gaiser 1950; Hermann 1936). Only record of this species from Michigan. Thought to be native, but disjunct from other known occurrences.

Liatris scariosa (L.) Willd. **Hanes:** *L. ×deamii* & *L. novae-angliae*
Rare. Collected by the Haneses mostly from overgrown WHITE-OAK-SAVANNA (including open OAK-HARDWOOD-FOREST) and collected by R. Brewer from the former right-of-way of the MI Central RR on the north edge of Genesee Prairie (very close to much former WHITE-OAK-SAVANNA). Apparently restricted, or nearly so to WHITE-OAK-SAVANNA and adjacent TERRESTRIAL-PRAIRIE. Once probably modal in WHITE-OAK-SAVANNA.

Liatris spicata Willd.
Gay Feather
Occasional. FEN sedge meadow. Reported by Brewer (1965) from an unusually high-quality WET-PRAIRIE within the right-of-way of the former MI Central RR near the WMU campus (this prairie was covered with fill in 1963–1964) (R. Brewer pers. comm.).

Matricaria discoidea DC. **Hanes:** *M. matricarioides*
Pineapple-weed
Common. Roadsides, lawns, gravel parking lots, and other waste places. Widely established.

Megalodonta beckii (Sprengel) Greene
Water-marigold
Current status unknown. Collected by the Haneses from Oatman Lake and the easternmost lake of Three Lakes (Richland Tp.).

Parthenium hispidum Raf.
Hairy Parthenium
Current status uncertain, very rare if still extant. Collected by the Haneses from a RR right-of-way W of Schoolcraft. Last collected here in 1969. Only known Michigan collection. Possibly adventive.

Polymnia canadensis L.
White-flowered Leafcup
Current status uncertain. Known by the Haneses from openings along the Kalamazoo River E of Kalamazoo, and from HARDWOOD-SWAMP alongside creeks.

Prenanthes alba L.
White Lettuce
Occasional. OAK-HARDWOOD-FOREST and SUGAR-MAPLE-FOREST, often on hillsides. The most frequently encountered *Prenanthes* in our terrestrial forests.

Prenanthes altissima L.
Tall White Lettuce
Occasional. Openings in HARDWOOD-SWAMP and RED-MAPLE-SWAMP.

Prenanthes racemosa Michaux
Glaucous White Lettuce
Current status uncertain. FEN, WET-MEADOW, and lakeshores, mostly in the S½ of the county.

Ratibida columnifera (Nutt.) Wooten & Standley
Long-headed Coneflower
Known from one collection made by H. R. Becker on 10 July 1936 from dry soil at "Camp Custer" (Hanes 1938). The Haneses noted that it was "possibly brought in with western hay." No longer known. Probably not native.

Ratibida pinnata (Vent.) Barnhart
Yellow Coneflower
Occasional along RR rights-of-way and roadsides, especially in the vicinity of former TERRESTRIAL-PRAIRIE. Also known from WET-PRAIRIE, BUR-OAK-SAVANNA, and WHITE-OAK-SAVANNA. Widely utilized in "prairie plantings."

Rudbeckia fulgida Aiton **Hanes:** *R. sullivanti*
Showy Coneflower
Occasional. FEN and alkaline WET-MEADOW, mostly in the N½ of the county. All our specimens are of the var. *speciosa*.

Rudbeckia hirta L.
Black-eyed Susan
Common. Dry roadsides and RR rights-of-way, oak savanna, TERRESTRIAL-PRAIRIE, FEN, WET-MEADOW, and lakeshores. Both introduced and native plants occur here.

Rudbeckia laciniata L.
Tall or Cutleaf Coneflower
Occasional. WET-PRAIRIE, WET-MEADOW, FEN, and other open wet situations.

Rudbeckia triloba L.
Brown-eyed Susan
Current status unknown. Known by the Haneses as "an infrequent escape" in wetlands and along a RR right-of-way. Probably native in wetlands, and introduced along the RR right-of-way (Voss 1996).

Senecio aureus L.
Golden Ragwort
Common. Open to wooded areas in FEN, and quite generally in wet, alkaline situations in TAMARACK-SWAMP, HARDWOOD-SWAMP, RED-MAPLE-SWAMP, SHRUB-CARR, and other thickets (especially near streams). Often associated with *Cypripedium calceolus*.

Senecio pauperculus Michaux
Northern Ragwort
Current status uncertain, very rare if still extant. Collected by the Haneses from a "moist grassy meadow E of Paw Paw Lake" (1943).

Senecio plattensis Nutt.
Prairie Ragwort
Current status uncertain. Mostly in the W½ of the county in BLACK-OAK-BARREN, OAK-HARDWOOD-FOREST, and WHITE-OAK-SAVANNA.

Silphium integrifolium Michaux
Entire-leaved Rosinweed
Rare. Fencerows, FEN meadow, TERRESTRIAL-PRAIRIE, BUR-OAK-SAVANNA, mesic (rather than dry-mesic) WHITE-OAK-SAVANNA, and as relicts of these plant communities along roadsides and RR rights-of-way. Known from within the boundaries of Genesee Prairie, Grand Prairie, Gourd-

neck Prairie, Gull Prairie, Prairie Ronde, and the remnant prairie along Arcadia (Bronson) Creek through and W of the WMU campus. Both the typical variety and the var. *deamii* are known from superficially native situations. Perhaps the largest remaining population grows in BUR-OAK-SAVANNA and TERRESTRIAL-PRAIRIE (including some WET-PRAIRIE) near and surrounding advertising billboards on the N side of Stadium Dr. just W of the WMU campus (on and near the right-of-way of the former MI Central RR, est. in 1847). Most plants have been mowed to the ground for the last 6 years, but when mowing subsides, such as during late summer 1996, and in fall 2002, hundreds of stems of this state threatened plant can be seen in flower. Several plants also occur further E along the RR right-of-way through the WMU campus. This site is worthy of protection, but may soon become a commercial development. Plants used to be much more abundant in this area and elsewhere on and near former TERRESTRIAL-PRAIRIE (R. W. Pippen pers. comm. 1996, pers. obs.). The only other relatively large extant population that I know of occurs in a prairie FEN in the Gourdneck State Game Area. Collected by the first botanical survey in 1838 at Gull Prairie. Probably once modal in blacksoil TERRESTRIAL-PRAIRIE and adjacent BUR-OAK-SAVANNA. This *Silphium,* rather than *S. laciniatum* or *S. terebinthinaceum*, was almost surely the dominant early fall color on our blacksoil TERRESTRIAL-PRAIRIEs. The same trends (fire suppression and subsequent shrub and tree growth, road widening, removal of fencerows, and herbicide application) that have plagued many of our other prairie and savanna plants are claiming the last remaining populations of this once extremely common plant.

Silphium laciniatum L.
Compass Plant
Extinct. Known only from two stems that grew along the RR right-of-way just NE of the intersection of Howard St. and Stadium Dr. on the WMU campus. First observed about 1975 (date uncertain) by R. W. Pippen and K. Chapman. Heavy shrub growth now covers the former site, and much RR right-of-way disturbance has since occurred in the area. Last observed in 1980 by K. Chapman. There are no other reports of this species from the county. Possibly adventive, but since this site lies within the former prairie and oak savanna dominated right-of-way of the MI Central RR (est. in 1847) there is a chance it may have been native. Probably not a significant component of former blacksoil TERRESTRIAL-PRAIRIEs, if it occurred in them at all. Not in Hanes & Hanes (1947).

Silphium perfoliatum L.
Cup Plant
Very rare. Persisting in a single location along a RR right-of-way W of the village of Schoolcraft. The plants regularly flower and set seed. This population was first identified by the Haneses, and has now been known for at least 60 years. Possibly adventive. Widely planted throughout the county.

Silphium terebinthinaceum Jacq.
Prairie-dock
Extinct. Collected by the Haneses only from "an unplowed field not far from the Portage River in section 6 of Climax Tp." Here, H. R. Becker had known there to be 30+ plants for more than 30 years previous to 1943 when the Haneses made their collection. This site was likely a wet-mesic prairie. The site, if properly relocated, is now covered by a heavy growth of *Lythrum salicaria* and *Typa latifolia*. This species has not since been collected, and is thought to be extinct in Kalamazoo County as a native species. A few plants have been seen in prairie plantings at the intersection of I-94 and Oakland Dr., in a prairie restoration near the entrance to West Lake Park, and in Harrison Prairie. The plants at Harrison Prairie are the result of seed introduced from the Michigan Nature Association Helmer Brook Fen and Prairie preserve (R. Pleznac pers. comm. 2002). The origin of the other plants is unknown. Probably not a significant component of former blacksoil TERRESTRIAL-PRAIRIE or BUR-OAK-SAVANNA, if it occurred in them at all. Prairie-dock is usually considered a mild calciphile and is sometimes associated with FEN elsewhere in southern Michigan. It is however not known from in or near FEN in Kalamazoo County.

Solidago altissima L.
Tall Goldenrod
Rare. Fencerows, roadsides, RR rights-of-way through TERRESTRIAL-PRAIRIE and WET-PRAIRIE, and in wet sandy depressions, mostly in the W½ of the county.

Solidago caesia L.
Bluestem Goldenrod
Occasional. OAK-HARDWOOD-FOREST.

Solidago canadensis L. **Hanes:** *S. altissima* var. *hargeri*
Canada Goldenrod
Common. Roadsides, old fields, and other open to partly shaded, often somewhat degraded habitats. While sometimes rather weedy, it is a native component of our prairie and savanna flora.

Solidago flexicaulis L. **Hanes:** *Solidago latifolia*
Zigzag Goldenrod
Collected by the Haneses and F. W. Rapp mostly from the SE¼ of the county in poorly-drained SUGAR-MAPLE-FOREST.

Solidago gigantea Aiton
Late Goldenrod
Occasional. Moist to wet forest openings, WET-MEADOW, old fields, and WET-PRAIRIE.

Solidago hispida Willd.
Hairy Goldenrod
Rare on hillsides in open OAK-HARDWOOD-FOREST, usually near lakes.

Solidago juncea Aiton
Early Goldenrod
Occasional in old fields and along roadsides and RR rights-of-way, especially through areas of former TERRESTRIAL-PRAIRIE and oak savanna.

Solidago missouriensis Nutt. **Hanes:** *S. glaberrima*
Missouri or Prairie Goldenrod
Current status uncertain, very rare if still extant. Collected by the Haneses from a roadside on Gourdneck Prairie (the road separating sections 11 and 12 of Schoolcraft Tp.). A collection made by Basil Stergios (*526*, MSC) on 2 August 1969 from "Louden old field" in section 5 of Ross Tp. is probably this species (determined by E. G. Voss). No longer occurs at the Schoolcraft Tp. collection site. Possibly overlooked elsewhere.

Solidago nemoralis Aiton
Gray Goldenrod
Occasional. Sandy old fields, BLACK-OAK-BARREN, overgrown dry to mesic WHITE-OAK-SAVANNA, and OAK-HARDWOOD-FOREST.

Solidago ohioensis Riddell
Ohio Goldenrod
Rare. Marly open FEN. Usually associated with *Liatris spicata* and *Potentilla fruticosa* (Pringle 1982).

Solidago patula Willd.
Rough-leaved Goldenrod
Occasional. HARDWOOD-SWAMP, COASTAL-PLAIN-MARSH, and WET-MEADOW.

Solidago riddellii Frank
Riddell's Goldenrod
Rare. WET-PRAIRIE, FEN, and grassy situations along marly lakeshores (but not always in FEN). Modal (at least today) in FEN meadow where it is often associated with *Cypripedium candidum, Potentilla fruticosa,* and *Valeriana uliginosa*.

Solidago rigida L.
Stiff Goldenrod
Occasional. Roadsides and RR rights-of-way, TERRESTRIAL-PRAIRIE, WHITE-OAK-SAVANNA, BLACK-OAK-BARREN, WET-PRAIRIE (Brewer 1965), and OAK- HARDWOOD-FOREST. Becoming relatively more common.

Solidago rugosa Miller
Rough-leaved Goldenrod
Occasional. At wetland edges with OAK-HARDWOOD-FOREST.

Solidago speciosa Nutt. **Hanes:** *S. rigidiuscula*
Showy Goldenrod
Occasional. Old fields, OAK-HARDWOOD-FOREST edges, roadsides, and RR rights-of-way, especially through former BLACK-OAK-BARREN, WHITE-OAK-SAVANNA, and TERRESTRIAL-PRAIRIE. We have two varieties here, the relatively earlier-blooming var. *jejunifolia* (the Haneses' (1947) var. *rigidiuscula*) and the later-blooming (and somewhat more abundant and weedy) var. *speciosa.* The var. *jejunifolia* is especially abundant in dry-mesic WHITE-OAK-OPENING and in BLACK-OAK-BARREN.

Solidago uliginosa Nutt.
Bog Goldenrod
Occasional. FEN.

Solidago ulmifolia Willd.
Elm-leaved Goldenrod
Occasional. Sandy dry-mesic to mesic and shrubby former oak savanna and OAK-HARDWOOD-FOREST edges, primarily in the NW¼ of the county.

Sonchus arvensis L.
Field or Perennial Sow-thistle
Common. Roadsides and RR rights-of-way. Not native.

Sonchus asper (L.) Hill
Prickly Sow-thistle
Common in a diversity of disturbed situations. Not native.

Sonchus oleraceus L.
Common Sow-thistle
Current status uncertain. Known from open disturbed situations.

Tanacetum vulgare L.
Common Tansy
Occasional. Roadsides. Most frequent in the NW¼ of the county. Not native.

Taraxacum erythrospermum Besser **Hanes:** *T. laevigatum*
Red-seeded Dandelion
Common. Forest edges and on thinly wooded hillsides.

Taraxacum officinale Wiggers
Common Dandelion
Common. Almost "everywhere" if any plant can be said to be so distributed. Widely established.

Tragopogon dubius Scop.
Common. Roadsides, RR rights-of-way, and old fields. Known to form interspecific hybrids here with *T. pratensis* (Hall et al. 1966; Voss 1996). Not native.

Tragopogon porrifolius L.
Salsify; Vegetable-oyster
Very rarely encountered along RR rights-of-way. Not native.

Tragopogon pratensis L.
Goat's-beard
Common. Roadsides and RR rights-of-way. Forms sterile hybrids here with *T. dubius*. Not native.

Vernonia gigantea (Walter) Branner & Coville **Hanes:** *V. altissima*
Tall Ironweed
Collected by the Haneses from E of Austin Lake and from section 12 of Alamo Tp. Reportedly "common" in WET-MEADOW and other marshland communities along the Kalamazoo River (Meagher & Tonsor 1992).

The hybrid *Vernonia ×illinoensis* (*V. gigantea* × *V. missurica*) is known from Kalamazoo County.

Vernonia missurica Raf.
Ironweed
Occasional. TERRESTRIAL-PRAIRIE, WET-PRAIRIE, WET-MEADOW, old fields, and FEN. Known to hybridize with *V. gigantea* forming the named hybrid *Vernonia ×illinoensis*.

Xanthium strumarium L. **Hanes:** *X. pungens* & *X. saccharatum*
Cocklebur
Common. Open moist situations, especially in wet, recently fallow fields and near streams and the Kalamazoo River. Not native.

APPENDIX I. Incomplete List of Plants Collected in Kalamazoo County by the First Botanical Survey.

The specimen data below have been drawn exclusively from notes laboriously compiled by R. McVaugh and supplied to me by E. G. Voss. Although some specimens housed at MICH have been consulted in writing this flora, most specimens listed here have not. Since few data were associated with these notes, and since I have only seen a few of the listed specimens, I have not updated the taxonomy used, nor can I be sure that when valid names are used, the plants are properly identified. Thus, this list is intended to serve only as a starting point for those interested in the first botanical survey collections from Kalamazoo County. I have treated each apparently unique set of label data as a unique collection. However, it is possible that some specimens are listed more than once in the notes from Rogers McVaugh (see McVaugh 1970 for additional commentary, especially regarding the collection of duplicates and problems with dates and other label data). Unless otherwise indicated all specimens cited here are housed at MICH. All "Notes" are those of the present author. Approximately 16 collections are known from 1837 and 75 from 1838 (not all listed here) (McVaugh 1970).

Name	Label Data	Notes
Allium tricoccum	Along Kalamazoo River, July 24 1838	
Allium tricoccum	July 28 1838	
Amaranthus retroflexus	Grand Prairie, July 21 1838	
Amaranthus tuberculatus	August 3 1838	
Amphicarpa monoida	August	
Andropogon gerardi	July 28 1838	
Angelica villosa	Kalamazoo	
Apios tuberosa	September 5 (1837?)	
Arenaria stricta	Grand Prairie, July 2 1838	
Arenaria stricta	Grand Prairie, July 23 1838	
Asclepias incarnata	Kalamazoo, July 23 1838	
Asclepias verticillata	August 4 1838	
Aster macrophyllus	Kalamazoo	
Athyrium thelypteroides	July 27 1838	2 sheets
Baptisia leucantha	August 1 1838	
Baptisia leucantha	Grand Prairie, August 1 1838	
Baptisia leucophaea	Grand Prairie, August 1 1838	NY
Boehmeria cylindrica	Kalamazoo, July 26 1838	2 sheets
Bouteloua curtipendula	Grand Prairie, July 23 1838	2 sheets
Bouteloua curtipendula	July 23 1838	
Buchnera americana	August [28–31], 1837	
Buchnera americana	August 1837	
Buchnera americana	Kalamazoo, July 23 1838	2 sheets
Cacalia atriplicifolia	July 27 1838	
Cacalia plantaginea	Kalamazoo, in a marsh near a lake 3 mi. E of the village, July 25 1838	2 sheets
Cardamine pratensis	Kalamazoo, in small lake, August 1838	
Carya amer?	August 1838	
Chelone glabra	August 28	
Chenopodium	July 27 1838	
Chenopodium botrys	August 23 1838 (1837?)	
Cladium mariscoides	Kalamazoo, around small lakes, July 25 1838	
Collinsia verna	July 27 1838	NY
Corallorhiza maculata	July 31 1838	
Coreopsis palmata	Gull Prairie, August 1 1838	
Coreopsis palmata	Kalamazoo, July 23 1838	NY
Desmodium bracteosum	August 3 1838	
Desmodium grandiflorum	Kalamazoo, 1838	

(Continued)

APPENDIX I. (Continued)

Name	Label Data	Notes
Desmodium nudiflorum	Kalamazoo, July 26 1838	
Desmodium paniculatum	August 1 1838	
Desmodium rotundifolium	August 4 1838	
Digitaria sanguinalis		2 sheets
Dioscorea villosa	Kalamazoo, August 2 1838	
Drosera rotundifolia	Around Lakes, Kalamazoo, July 23 1838	
Drosera rotundifolia	Kalamazoo, around lakes July 25 1838	
Dryopterus thelypteris	Kalamazoo	
Dulichium arundinaceum	July 28 1838	
Echinacea purpurea	Gull Prairie, August 2 1838	
Echinocystis lobata	August 1838	
Eleocharis equisetoides	Sand Lake 1838	
Elymus villosus	[Kalamazoo] Michigan	
Elymus villosus	Kalamazoo, July 24 1838	2 sheets
Eragrostis hypnoides	Kalamazoo, July 20 1838	2 sheets
Euonymus americana	Along River	
Euonymus americana	July 23 1838	
Euonymus americana	Kalamazoo, July 24 1838	
Euonymus obovatus	Kalamazoo	
Eupatorium perfoliatum	August 3 1838	
Gnaphalium uliginosum	August 28 (1837?)	
Goodyera pubescens	July 31 1838	
Habenaria ciliaris	Austin's Lake, July 30 1838	
Habenaria ciliaris	Austin's Well, July 30 1838	
Habenaria leucophaea	1838	NY
Habenaria psycodes	Kalamazoo, July 25 1838	
Habenaria psycodes	Kalamazoo, July 26 1838	
Habenaria tridentata	Austin's Lake, Kalamazoo, July 1838	
Hackelia virginiana	July 27 1838	
Helianthus divaricatus	Kalamazoo, July 24 1838	
Helianthus giganteus	Kalamazoo	
Hemicarpha micrantha	Austin's Lake, July 30 1838	2 sheets
Hemicarpha micrantha	July 30 1838	
Hippuris vulgaris	July 23?–August 7 1838	
Hippuris vulgaris	Kalamazoo, July 28, 1838	
Hydrocotyle umbellata	Kalamazoo, 1838	
Hydrophyllum appendiculatum	July 31 1838	
Hypericum ascyron	July 31 1838	
Hypericum prolificum	Kalamazoo, 1838	
Hypericum punctatum	Kalamazoo, July 24 1838	
Hystrix patula	July 24 1838	
Impatiens biflora	Kalamazoo, ditches, July 25 1838	
Juncus acuminatus	July 28 1838	2 sheets
Juncus marginatus	September 1 1837?	
Lechea major	Kalamazoo, August 1838	
Lechea villosa	August 4 1838	
Lemna minor	Gull Lake, August 1838	
Linum sulcatum	August 1 1838	NY
Linum sulcatum	Grand Prairie, July 23 1838	
Lobelia cardinalis	Kalamazoo, margin of river, July 23 1838	
Lobelia kalmii	July 27 1838	
Lobelia kalmii	Kalamazoo, July 25 1838	
Lycopus virginicus	Gull Lake, August 2 1838	

Name	Label Data	Notes
Lysimachia ciliata	Kalamazoo, July 26 1838	
Nyssa sylvatica	Near Austin's Lake, August 1838	
Panax quinquifolius	Kalamazoo, July 1838	
Panicum latifolium	August 7 1838	
Panicum virgatum	July 28 1838	2 sheets
Parnassia glauca	Kalamazoo, July 25 1838	2 sheets
Paronychia canadensis	August 1 1837 (changed to 1838)	
Phytolacca decandra	July 27 1838	
Polygonum buxiforme	August 5 1838	
Polymnia canadensis	August 3 1838	
Potamogeton pectinatus	Grand Prairie, August 2 1838	
Potamogeton pectinatus	Gull Lake, Kalamazoo, August 1838	
Potamogeton pectinatus	Gull Prairie Lake, August 2 1838	
Pycnanthemum virginianum	Kalamazoo, July 24 1838	
Pyrola secunda	July 31 1838	
Rhus copallina	Austin's Lake, Kalamazoo, July 1838	
Rhynchospora alba	Kalamazoo, around small lakes, July 25 1838	
Sabatia angularis	Austin's Lake, July 30 1838	
Sagittaria graminea	Austin's Lake, July 20 1838 [July 30]	
Satureja acinos	August 1838	
Scirpus cyperinus	July 30 1838	
Scleria lindleyana	July 28 1838	
Scleria lindleyana	Small Lakes, July 28 1838	
Scleria triglomerata	Grand Prairie, July 23 1838	
Silphium integrifolium	Gull Prairie, August 2 1838	
Sparganium chlorocarpum	Kalamazoo, August 2 1838	
Spirea alba	July 28 1838	
Stachys hyssopifolia	July 30 1838	
Taraxacum officinale	July 27 1838	
Thaspium trifoliatum	July 23?–August 7 1838	
Thaspium trifoliatum	Kalamazoo	
Tradescantia virginiana	August 1838	
Triglochin palustris	Kalamazoo, July 1838	
Triglochin palustris	Kalamazoo, Marsh around small lake July 25 1838	
Urtica gracilis	Kalamazoo, July 25 1838	
Utricularia gibba	Kalamazoo, July 1838	
Utricularia purpurea	Austin's Lake, Kalamazoo, July 1838	
Viola canadensis	July 27 1838	
Xyris caroliniana	Austin's Lake, August 1838	
Zigadenus glaucus	July 28 1838	

APPENDIX II. Hanes & Rapp Collection Sites & Herbarium Notes.

Below I have provided USGS Topographic Map data to better locate some of the collection sites listed on Hanes & Rapp herbarium specimens at WMU and in the Haneses' flora. These sites were located with the help of information on herbarium labels, notes left by the Haneses and F. W. Rapp, property records, publications, manuscripts, and my own field experience and familiarity with the Kalamazoo County landscape. Many F. W. Rapp locality data were originally provided by R. W. Pippen in the form of notes taken during an interview with Rapp (Hultmark 1982; Snow 1958). In parentheses under the heading "Site Descriptors," I have provided additional notes when warranted. The Haneses and F. W. Rapp generally reported distances from their respective former homes on herbarium labels. The first name given on specimens in the Hanes herbarium is the location where the mounted specimen was collected. Many specimens bear additional label data referring to other localities in the county where a plant was known to occur. An annotation bearing the name Becker-Hanes means that Herbert R. Becker showed the Haneses where the plant was growing. An annotation reading "Herbert R. Becker" means that Becker gave the specimen to the Haneses. A small part of the Rapp collection is housed at the Kalamazoo Nature Center. Otherwise, most Hanes & Rapp specimens are housed at the WMU Hanes herbarium. Several sites listed here remain to be definitively relocated. They are included here in the hope that someday someone will take the time to further pinpoint their location. The task of relocating these sites was made more difficult by the apparent loss of a plat map used by the Haneses that used to be housed at WMU.

Site Descriptors (Hanes/Rapp)	USGS Topographic Map Location	Notes
Adam's Estate 1.5 mi. S of Vicksburg (Rapp)	T4S R11W SE¼ S25	On 24th St.
Alamo Hill (Hanes)	T1S R12W on line between S27 & S28	1 mi. S of Alamo: 6th St. climbs this hill
Andrew's bridge on old Hwy 131 (Hanes, Rapp)	T4S R11W N½ NE¼ NE¼ S5	Now Shaver Rd. at its intersection with the Sugarloaf Lake flooding
Andrew's Creek (Hanes, Rapp)	T4S R11W N½ S4 & N½ S5 & T3S R11W SW¼ SE¼ S33	Where Shaver Rd. passes the Sugarloaf Lake flooding
Balch Creek (Rapp)	T2S R11W S½	Actually Portage Creek*
Barley Motors (Hanes)	T4S R11W N½ S5 & N½ S4 extending into S3 & S-Central edge of S33	E of where Shaver Rd. passes through the Sugarloaf Lake flooding
Bear Creek* (Rapp)	T4S R10W S22 (for Brown Creek*)	Rapp usually means Brown Creek* 4 mi. SE of Vicksburg. Bear Creek* is found further W
Bear Creek* at Andres (Rapp)	T4S R10W S22	Woods on the E side of Brown Creek* on 31St St.
Beaver Dam (Hanes)	T4S R11W N½ S5	Near intersection of the drain out of Sugarloaf Lake & Oakland Dr.
Beech Loaf Island (Hanes)	T3S R11W Center S½ S31	See Fox Island
Bunker Hill (Hanes)	T3S R11W NE¼ S31	A small hill N of Sugarloaf Lake
Campbell Lake (Hanes)		Long Lake, Comstock Tp.

Site Descriptors (Hanes/Rapp)	USGS Topographic Map Location	Notes
Cement Bridge 1.25 mi. S of Vicksburg (Rapp)	T4S R10W S30	Kimble Creek bridge on 24th St.
Bruce Chamberlain Farm (Hanes)	T4S R11W S11	Near Portage Rd. & U Ave. on the E of the Road
Clarks Orchard 1 mi. SE of Vicksburg (Rapp)	T4S R10W S19	On an old road (now closed) W of Uptegrove Lake
Cobb School (Hanes)	T4S R11W S edge S5	N side of U Ave. E of 14th St.
Cold Springs (Hanes)	T1S R12W NW¼ S24	2 mi. E of Alamo
Cooley's Farm (Rapp)	T4S R11W S½ NW¼ S24	S side of the Vicksburg Creek S of the Cemetery
Crane Town (Hanes)	In a strict sense limited to T4S R12W S20	Sometimes used in a strict sense to include only an island of 3 or 4 acres a short distance N of the Pleasant Valley Church. In a larger sense it takes in all of the marshy land around Flowerfield Creek in Prairie Ronde Tp.
Creeks emptying into Mud Lake (Rapp)	T3S R11W SE¼ NE¼ S31 & T3S R11W SW¼ NW¼ S32	
Davis Woods (Hanes)	T4S R12W N½ S½ S23	
Drake School (Hanes)	T2S R11W S19	N side of Michigan Ave. E of Drake Rd.
Bert Duncan Farm (Hanes)	T4S R12W probably N½ SE¼ S36	SW of Schoolcraft near Flowerfield Creek
E of Little Portage Creek * (Rapp)	T4S R10W W½ S21	Portage River* 2.5 mi. E of Vicksburg & .5 mi. S on the E side of the road
Fanckboner School (Hanes)	T4S R12W S14	SW corner of VW Ave. & 10th St.
Field W of No. 8 School (Hanes)	T4S R12W school lies at the extreme SW¼ of the NW¼ of S16	
Fox & Beers Millpond (Hanes)	T4S R12W N½ SE ¼ S26	
Fox Island (Hanes)	T3S R11W Center S½ S31	Immediately W of Sugarloaf Lake, N of Sugarloaf Island
Fruit Belt Railway Texas Tp. (Hanes)	T3S R12W parts of S4, S5, S7, S8, & S18	
Fulton's Marsh (Hanes, Rapp)	T4S R11W S14	Between W Ave. & VW Ave. N of GTRR. Fulton's Marsh was adjacent to & continuous with Hettingas Marsh. The names reflect the 2 owners.

(Continued)

APPENDIX II. (Continued)

Site Descriptors (Hanes/Rapp)	USGS Topographic Map Location	Notes
Frank Gilchrist Woods (Hanes)	T4S R 12W probably NE¼ NE¼ S35	
Godshalk Addition (Hanes, Rapp)	T4S R10W S19	SE of intersection of W Ave. & 24th St.
GTRR near "Spring Run" (Spring Run) (Hanes)	T4S R11W S14	
Guilford Marsh (Hanes)	T4S R12W N½ NW¼ S33	5 mi. W of Schoolcraft near the GTRR
Hanes-Bartholomew Farms (Hanes)	T4S R11W SW¼ S22	
Hanner (Frank) Farm (Frank Hanner's) (Hanes)	T3S R12W NE¼ S25	NE of Weeds Lake
Harper's Woods (Hanes)	T4S R10W probably N½ NE¼ S35	Near the intersection of XY Ave. & 32nd St.
Harrington Marsh (Rapp)	T4S R11W W½ SW¼ S24	W of the junction of X Ave. & 22nd St. NE of Barton Lake
Harrison Cemetery (Hanes)	T4S R12W W edge NW¼ NW¼ S12	
Hermann's Farm (Hanes)	T4S R10W S11	Vicinity of U Ave. & 32nd St.
High wooded ridges in Charleston Township (Hanes)	T2S R9W S15	3.5 mi. E of Galesburg
Holcomb Woods (Hanes, Rapp)	T4S R9W E½ SE½ S30	2.5 mi. SW of Fulton, S of creek
Indian Fields (Hanes)	T2S R11W S-Central edge S2	
Island Marsh (Hanes)	T4S R11W SW¼ SW¼ S18,	W of Schoolcraft N of W Ave. in the "Island" woods
Island Woods (Hanes)	T4S R11W SW¼ SW¼ S18	Immediately W of Schoolcraft mostly on the N side of W Ave.
Jas. Budrow Farm & Marsh; Jas. Budrow Muck Farm; Budrow Farm (Hanes)	T4S R11W E½ NE¼ S5, S of Andrew's Creek	S & E of the Sugarloaf Lakes
Jenkinson School (Hanes)	T4S R10W SW¼ SE¼ S17	N side of intersection of W Ave. & 27th St.
Kealey (Hanes)	T2S R10W S edge SW¼ S8	
Kerns Crossing (Hanes)	T4S R10W S edge of S7	GTRR crossing E of Sprinkle Rd. on V Ave.
Bessie Knight Woods (Hanes)	T4S R12W probably N½ S30	

Site Descriptors (Hanes/Rapp)	USGS Topographic Map Location	Notes
Krum Marsh (Hanes)	T4S R11W SE¼ NW¼ S19	W of old grain elevator at Schoolcraft
LeFevre Bog (Hanes, Rapp)	T3S R9W Center of SE ¼ S8	
Levi Luce Farm (Hanes)	T4S R12W S1 probably S½ SW¼	
Lost Island Marsh (Hanes)	T4S R11W on line between S18 & S19	E side of the village of Schoolcraft
Lost Island School (Hanes)	T4S R11W SE¼ SE¼ S17	NW corner of W Ave. & 16th St.
Marsh 4 mi. NE (Rapp)	T4S R10W S9	W of 29th St. between the creek & the Road
Marsh near school (Rapp)	T4S R10W S18	In Vicksburg City on W Ave.
Moist Woods Hetrick's Bridge (Rapp)	T4S R10W SW¼ S28	Y Ave. at the Portage River*
Moyers Corner (Rapp)	T4S R10W E½ S28	Corner of XY Ave. & 30th St.
Mud Hole (Rapp)	T4S R11W middle of E½ S25 & T4S R10W N½ S30	A small pond E of Kimble Lake on Portage Creek & a part of the outlet to this lake.
Mud Lake Portage Tp. (Hanes)	T3S R11W SE¼ NE¼ S31 & now T3S R11W SW¼ NW¼ S32 (has increased in size)	N of the Sugarloaf Lakes in the Gourdneck State Game Area
Munn Marsh (Rapp)	T4S R10W S16	Near 29th St. & V Ave. A fence separated Clarks Marsh (E side of fence) from Munn Marsh (W side).
Near McKain's Corners 6 mi. NE (Rapp)	T3S R10W S36	McKain's Corners is the extreme NW corner of S36. It lies at the intersection of S Ave. & 34th St.
Near Sugarloaf Lake along the Railway (Hanes)	T4S R11W N½ S5	
Neasmith RR Crossing (Hanes, Rapp)	T4S R11W on line between S14 & S23. Neasmith owned the propery to the S of this line.	Where GTRR crosses W Ave. 4 mi. E of Schoolcraft
Nesbitt Wood (Hanes)	T3S R12W SE¼ SE¼ S33	
Nichols Farm 5 mi. SE (Hanes)	T4S R10W S34	
No. 8 School (Hanes)	T3S R11W SW¼ NE¼ NE¼ S32	

(Continued)

APPENDIX II. (Continued)

Site Descriptors (Hanes/Rapp)	USGS Topographic Map Location	Notes
Oak Grove School (Hanes)	T1S R12W S23	W of Ravine Rd. near intersection with Owen Dr.
Old Churchyard 5 mi. SE (Rapp)	T4S R10W W-central edge S34	31st St. at YZ Ave.
Osborn Farm (Hanes)	T3S R11W N½ SE¼ NW¼ S32 & N½ SW¼ NE¼ S32	N of Sugarloaf Lake & W of Shaver Rd.
Oswalt Marsh (Simmons Marsh; Oswalt bought the property from Simmons) (Rapp)	T4S R10W Center S19 (probably NE¼ SW¼)	SE of Frazer's Grove
Outlet of Barton Lake (Rapp)	T4S R11W S26	
Outlet of the two Mud Lakes (Hanes)	T1S R12W N½ S22 & NW¼ NW¼ SE¼ S22	Small creek SE of Alamo
Patton's Marsh (Hanes)	T4S R12W at the center of the S edge of S12	
Pleasant Valley School (Hanes)	T4S R12W SE¼ S29	E side of 3rd St. between XY Ave. & Y Ave.
Philip Porter Farm (Hanes)	T4S R12W E½ S20	5 mi. W of Schoolcraft on S side of Road, E of Flowerfield Creek
Portage Lake (Hanes)		The name Portage Lake used on some USGS topo maps is actually a group of three lakes in Section 34 Comstock Tp. that the Haneses often break up into their individual names of Blue, Long, and Portage Lakes
Prairie Grove School (Hanes)	T4S R11W Center S27	S side of junction of XY Ave. & Barton Lake Rd.
Prudential Nursery (Rapp)	T4S R11W S13 & T4S R10W S18	The current site of the Prudential Nursery in Vicksburg
Rapp House (Rapp)	T4S R10W S19	213 E Highway St. (W Ave.) Vicksburg
Rapp's Woods (Rapp)	T4S R10W NE¼ S24	SW corner of the intersection of W Ave. & 36th St.
Raynor's Woods (also misspelled Rayner) (Hanes, Rapp)	T4S R10W E½ W½ S35	
Frank Reeds (Hanes)	T4S R11W S13	Vicksburg 2 blocks W of the Rapp home on Highway St. (W Ave.)
Frank Reeds Marsh (Hanes)	T4S R11W S13	On Highway St. (W Ave.) just S of the RR right-of-way
Rix School (Hanes)	T3S R12W S5	NW corner of O Ave. & 4th St.

Site Descriptors (Hanes/Rapp)	USGS Topographic Map Location	Notes
School No. 8 Portage Tp. (Hanes)	T3S R11W S32	E side of Oakland Dr. N of Osterhout Rd.
Albert E. Schumann Farm (Hanes)	T4S R11W S17	On the N side of VW Ave.
Grant & Bruce Schutes Land (Hanes)	T4S R12W SE¼ S20 & SW¼ SW¼ S21	
S16 School (Prairie Ronde Tp.)	T4S R12W S16	W side of 5th St. at VW Ave.
Shaffer's Woods (Hanes)	T4S R11W N½ S34	NE of Goose Lake
Small Creek NW of Sugarloaf Lake (Hanes)	T3S R11W E½ S31	
Reuben Smith's Woods (Hanes)	T4S R12W probably NW¼ S25	3 mi. SW of Schoolcraft
Sphagnum bog West Lake (Hanes)	T3S R11W E½ SW¼ SW¼ S22	W end of West Lake
Spring Brook (Hanes)	T1S R10W S19	Small stream emptying into the Kalamazoo River. Most collecting was done in Section 19
Spring Brook School (Hanes)	T1S R10W S9	N side of M-89 about ½ mi. E of 28th St.
Spring Run (Hanes)	T4S R11W S14	Small stream that runs through Fulton's Marsh & crosses VW Ave.
Stockyard (Rapp)	T4S R10W S7	NE side of Vicksburg on GTRR
Stream connecting the two Sugarloaf Lakes (Hanes)	T3S R11W S½ S31	
Sugarloaf Island (Hanes)	T3S R11W S31	Take Sugar Isle Dr. to Higley Circle which circles Sugarloaf Island
Sugarlot (Hanes)	See "Island Woods" (Hanes)	
Texas Corners (Hanes)	T3S R12W intersection of S14, S15, S22 & S23	Intersection of 8th St. & Q Ave.
M. P. Thomas Farm Marsh (Hanes, Rapp)	T4S R12W Center of N½ SW¼ S24	
Toad Hollow School (Hanes)	T2S R9W S32	N side of MN Ave. between 38th St. & 39th St.
Towers School (Hanes)	T3S R12W SE¼ SE¼ S22	NW corner of R Ave. & 8th St.
Vicksburg 2.5 mi. E; S to end of Road, W along fence (Rapp)	T4S R10W S21	Where 29th St. turns E
Vicksburg Creek (Rapp)	T4S R11W S24	Creek that runs through Vicksburg
Vicksburg Drain (Rapp)	T4S R10W S18	E of RR right-of-way

(Continued)

APPENDIX II. (Continued)

Site Descriptors (Hanes/Rapp)	USGS Topographic Map Location	Notes
Well's Woods (Hanes)	T3S R11W E½ SW¼ S31	N of Sugarloaf Lake
West Fork of Portage Creek* wooded streamside (Hanes)	T3S R11W NE¼ NE¼ S5	1 mi. S & a little W of Whites Lake
West of Fuller Crossing (Hanes, Rapp)	T4S R10W S30	Fuller Crossing is the RR crossing at Y Ave.
Westervelt Farm (Rapp)	T4S R10W S22	31st St. S of Bear Creek*
Woods along Kalamazoo River E of Galesburg (Hanes)	T2S R9W parts of S8 & S9	Along N side of Kalamazoo River
Worthington Crossing (Hanes)	T4S R11W NE¼ S22	4 mi. E of Schoolcraft

*Rapp appears to have confused the Little Portage Creek with the Portage River, usually intending to refer to the latter. He also confused Bear Creek with Brown Creek, usually meaning to refer to the latter. This is a reasonable mistake because Bear Creek & Little Portage Creek are both found just a little further west.

APPENDIX III. Kalamazoo County Plant Communities.

Headings in caps indicate abbreviations used in the text of the annotated checklist. A classification is already available for Michigan (Albert 1995), but I present a slightly different version here that should better meet the needs of this flora. This classification incorporates local pre-European settlement and contemporary data with elements adapted from other sources. I have drawn much material from my field experience in Kalamazoo County. Numerous publications and unpublished reports have also been consulted in preparing this appendix. The following references were some of the most influential: Albert 1995; Albert 1990; Albert et al. 1986; Brewer et al. 1984a; Brewer et al. 1984b; Brewer et. al. 1969; Chapman et al. 1989; Chapman 1984; Comer et al. 1997; Comer et al. 1995; Curtis 1959; Hodler et al. 1981; Kenoyer 1934; Kenoyer 1930; Pippen 1991. Pre-European settlement vegetation maps of Kalamazoo County accompany the description of each plant community. I have adapted these maps from previously published interpretations of the GLO surveys of 1826–1830, and I have incorporated some of my own observations (Brewer et al. 1984a; Comer et al. 1997; Comer & Albert 1995; and Hodler et al. 1981).

I have treated prairie and savanna plant communities in relatively more detail than most others (including photos) due to their former importance, present rarity (they are nearly extinct in Kalamazoo County), and their enigmatic natural history. I have also spent an inordinate amount of my time studying them.

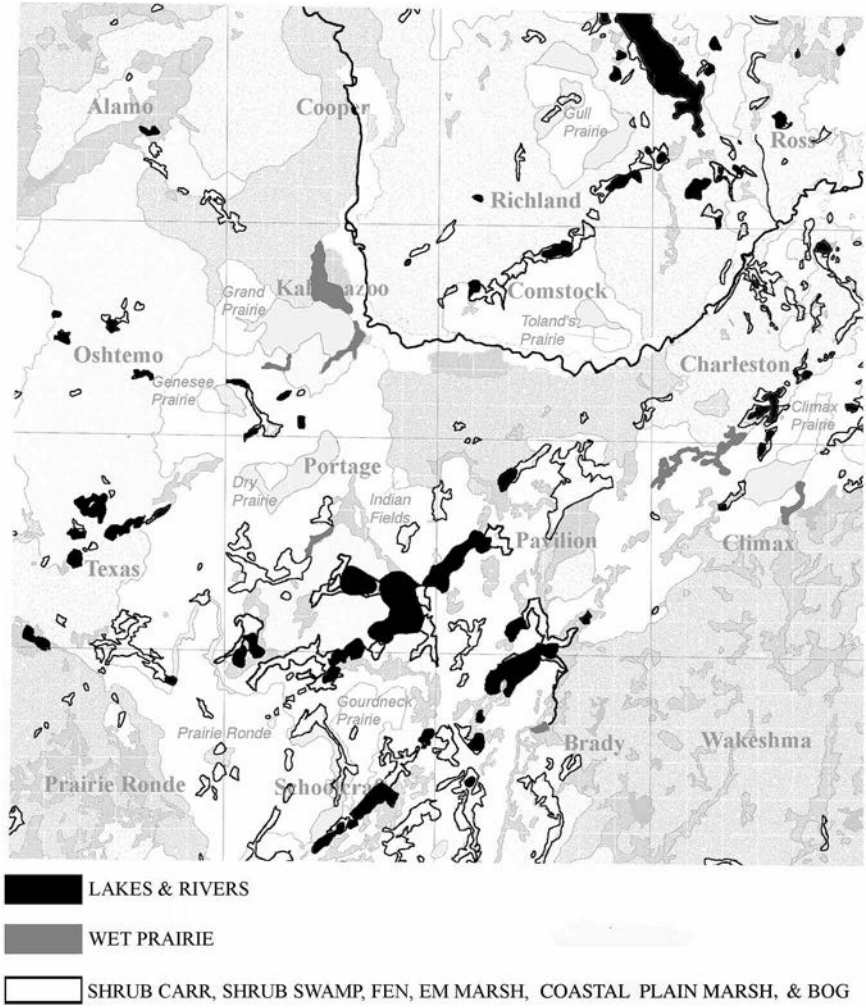


FIGURE 4. An interpretation of the GLO surveys of 1826–1830, showing the approximate presettlement distribution of lakes, the Kalamazoo River, wet prairie, and other open wetlands in Kalamazoo County. Map adapted from Comer & Albert (1995), Comer et al. (1997), Brewer et al. (1984a, 1984b), and Hodler et al. (1981).

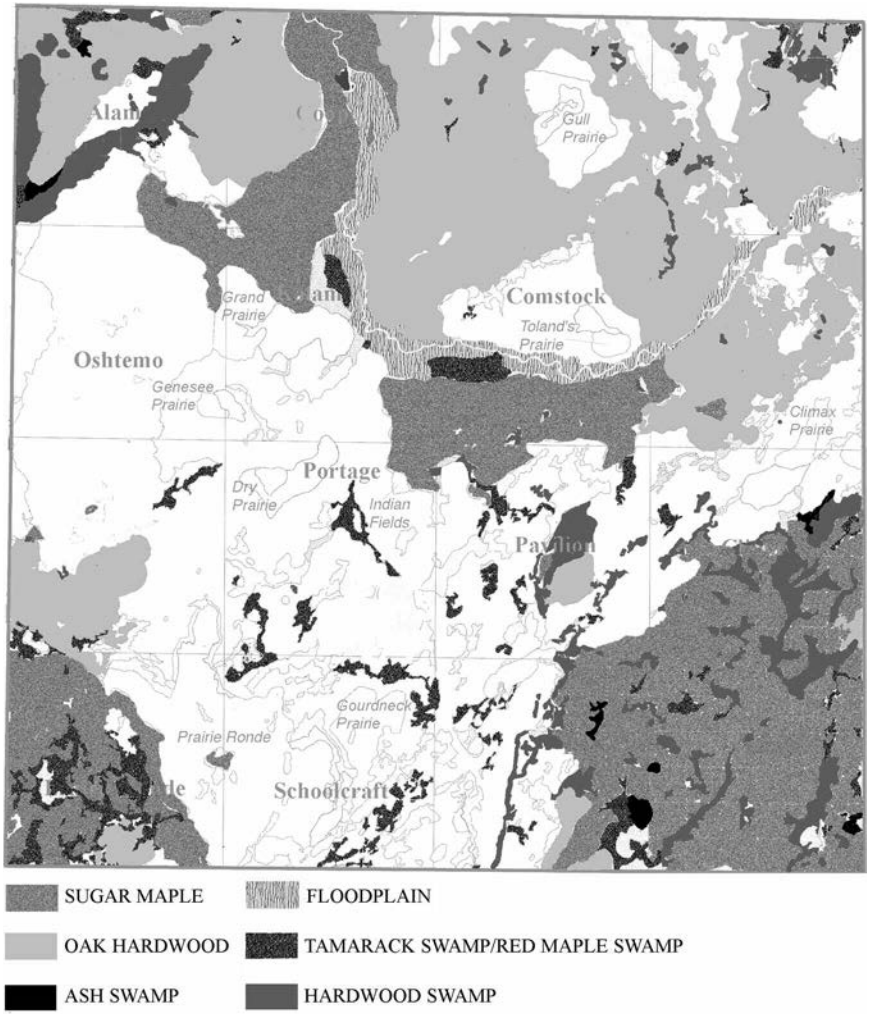
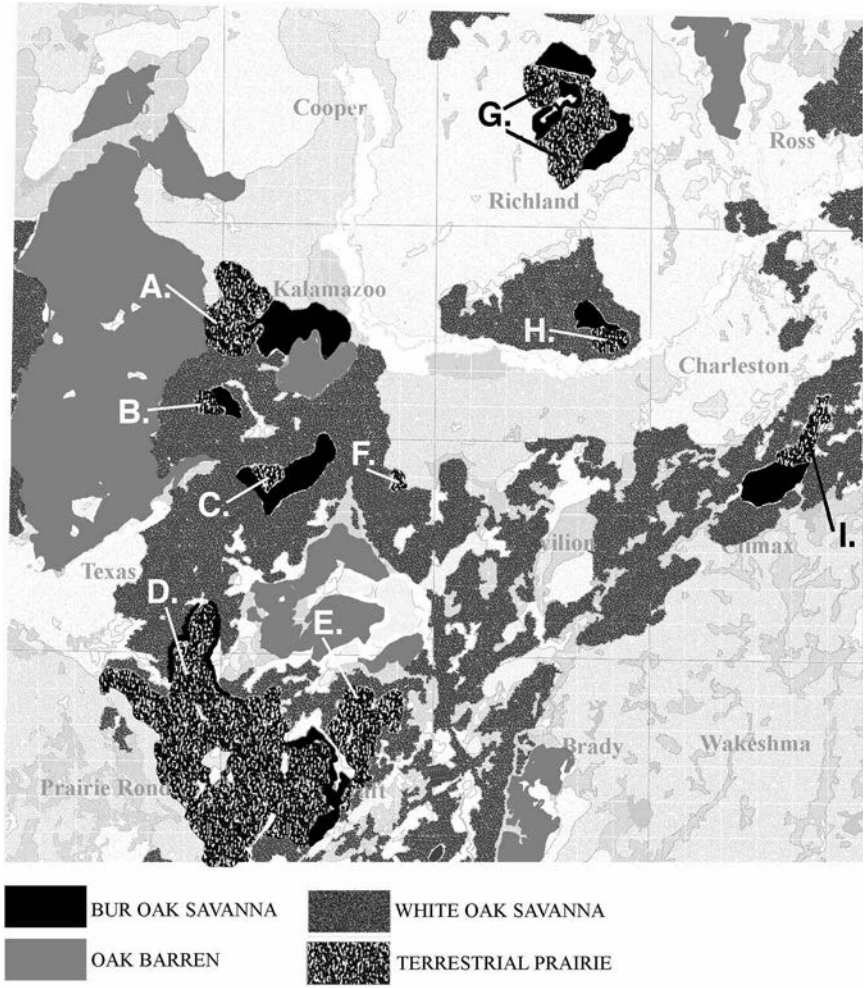


FIGURE 5. An interpretation of the GLO surveys of 1826–1830, showing the approximate presettlement distribution of forested wetlands and terrestrial forests. Mixed oak forest, which occurred only on the extreme W edge of Prairie Ronde Tp. is not shown. Wetlands dominated by white pine, which occurred only near the Sugarloaf Lakes and near Goose Lake, are probably best treated as a form of savanna resulting from fire in RED MAPLE SWAMP. It is not separated from TAMARACK SWAMP and RED MAPLE SWAMP on this map. Map adapted from Comer & Albert (1995), Comer et al. (1997), Brewer et al. (1984a, 1984b), and Hodler et al. (1981).



(A.) Grand Prairie, (B.) Genesee Prairie, (C.) Dry Prairie, (D.) Prairie Ronde, (E.) Gourdneck Prairie, (F.) Indian Fields, (G.) Gull Prairie, (H.) Toland's Prairie, (I.) Climax Prairie

FIGURE 6. An interpretation of the GLO surveys of 1826–1830, showing the approximate presettlement distribution of prairie and savanna. White pine dominated wetlands, which covered only a few acres near the Sugarloaf Lakes and S of Goose Lake is probably best treated as a form of savanna. It is shown on the previous map, but not separated from TAMARACK SWAMP and RED MAPLE SWAMP (see treatment of RED MAPLE SWAMP). Adapted from Comer & Albert (1995), Comer et al. (1997), Brewer et al. (1984a, 1984b), and Hodler et al. (1981).

Aquatic/Wetland

***Open Aquatic/Wetland* (Figure 4)**

Submergent Marsh (SUB-MARSH). Submergent marsh often forms a dynamic interface with emergent marsh. Variations in the depth of water and substrate, disturbance history, and other factors provide for much variety in floristic composition. For utility, and despite evidence to the contrary, I do not formally recognize variants of submergent marsh. Some typical plants include *Ceratophyllum demersum, Elodea canadensis, Heteranthera dubia, Myriophyllum* spp., *Najas* spp., and *Potamogeton* spp.

Emergent Marsh (EM-MARSH). Emergent marsh is usually submerged for most of the year. It often forms a dynamic interface with submergent marsh. Some typical plants include *Eleocharis robbinsii, Glyceria borealis, Leersia oryzoides, Lemna minor, L. trisulca, Nuphar* spp., *Nymphaea* spp., *Phragmites australis, Polygonum* spp., *Pontederia cordata, Sagittaria latifolia, Scirpus acutus, S. fluviatilis*, *Sparganium* spp., *Typha latifolia, Utricularia* spp., and *Zizania aquatica*. For utility, and despite evidence to the contrary, I formally recognize only one variant of submergent marsh (coastal plain marsh) below and in the annotated checklist.

Remnant prairie wetlands harbor unique emergent marsh and submergent marsh communities not found elsewhere in the county. These marshes are dynamic, and in some years may dry up completely. This tendency has led to their demise since in low water years they are/were often grazed or plowed. Plants restricted, or nearly so, to relatively intact remnants of these wetlands include *Astragalus canadensis, Carex sartwellii, Eleocharis engelmanii,* and *Potentilla anserina*. Prairie wetlands may also harbor rare plants usually associated with coastal plain marshes such as *Rhynchospora macrostachya* and *Rotala ramosior*. Some examples of prairie wetlands include the Island Pond, Harrison Lake, Weeds Lake, the Lost Island Marsh, and Patton's Marsh, all of which occur on the former Prairie Ronde (in Prairie Ronde & Schoolcraft Tps.). There are numerous other smaller examples. A few of these may have potential as sites for palynological study of the little-known dynamics and natural history of Prairie Ronde and/or other of the former large terrestrial prairies.

Coastal Plain Marsh (COASTAL-PLAIN-MARSH) Figures 7–8. Coastal plain marsh is a variant of emergent marsh usually associated with sandy to peaty substrates of lakes and ponds with dynamic water levels. Coastal plain marsh is formally recognized here as distinct from other emergent marsh communities due to the many plants that are found nowhere else in Kalamazoo County. The name coastal plain marsh refers to the floristic similarity of these wetlands to marshes on the Atlantic Coastal Plain. Most coastal plain marshes are in the west half of the county. They are usually associated with sandy former black oak barrens.

Coastal plain marsh plant communities are dynamic and usually exhibit concentric zonation related to water level. Some typical plants from the sandy zone at the waters edge or in shallow water include *Carex scoparia, Eleocharis melanocarpa, Fuirena squarrosa, Hemicarpha micrantha, Juncus* spp.,

FIGURE 7. Coastal plain marsh with *Calamagrostis canadensis* and *Rhynchospora macrostachya* SW of Austin Lake (Portage Tp.) photographed in August 2002.

FIGURE 8. Sandy lakeshore (with native coastal plain marsh flora) at Pretty Lake (Texas Tp.) photographed in August 2002.

Rhynchospora macrostachya, Sabatia angularis, and *Euthamia remota*. Other plants, including *Calamagrostis canadensis,* and *Eupatorium perfoliatum,* are more common where the substrate is slightly drier, and plants such as *Cephalanthus occidentalis,* and *Spiraea tomentosa,* are usually limited to the relatively dry margin of the marsh (Brodowicz 1989; Fernald 1942; Hanes 1942; Peattie 1922; Pierce 1974; Reznicek 1994). Relatively undisturbed sandy lakeshores, but without significant areas of marsh, often support coastal plain marsh plant communities. Coastal plain marsh communities are home to some of the rarest plants in Kalamazoo County and in Michigan.

Several Kalamazoo County plants are known only from coastal plain marsh and other sandy/peaty lakeshores, among these are *Carex viridula, Eleocharis melanocarpa, Euthamia remota, Fuirena squarrosa, Hemicarpha micrantha, Lycopodiella inundata, Polygala cruciata, Psilocarya scirpoides, Rhexia virginica, Sabatia angularis, Utricularia purpurea,* and *Xyris torta*. Increasing recreational pressure and further development of sandy lakeshores, including artificial stabilization of water levels (especially in Texas and Portage Tps.), do not bode well for the future of these unique and globally rare wetlands.

Wet Meadow (WET-MEADOW). Wet meadow is usually located along streams and in stream valleys, along lake margins, and in other depressions. Soils are usually saturated, mucky, and poorly drained. Floristic composition varies greatly depending on substrate pH and texture, drainage, fire history, water level, and other factors. Sedges and grasses dominate. Some typical plants today include *Angelica atropurpurea, Asclepias incarnata, Calamagrostis canadensis, Carex aquatilis, C. bebbii, C. lacustris, C. lanuginosa, C. stricta, Eupatorium maculatum, Helianthus giganteus, Phalaris arundinacea* (especially after grazing), *Potentilla fruticosa, Solidago patula, Spartina pectinata, Spiraea tomentosa*, *Thalictrum dasycarpum*, *Thelypteris palustris,* and *Typha latifolia*. Wet meadow superficially resembles wet prairie. Fire was once a component of wet meadow ecology and probably helped maintain their open character. Today, shrubs have invaded large areas of former wet meadow. Unplowed and otherwise relatively undisturbed wet meadow communities occur throughout the county, but some of the largest, least altered, and the most floristically rich, are concentrated in Prairie Ronde Tp. along the course of Flowerfield Creek. While not formally recognized or elaborated upon here, several distinctive variants of wet meadow occur in Kalamazoo County.

Bog (BOG) Figure 9. Bog is something of a catch-all category for peatlands with a *Sphagnum* or *Sphagnum* and sedge substrate greater than about 30 cm thick (Crum 1988). For utility, and despite evidence to the contrary, I have grouped all of these bog-like wetlands under one name. Hydrology and nutrient levels, pH, and fire history, are some important factors affecting floristic composition. Mosses (*Sphagnum* spp. & rarely *Polytrichum*) are very important. In our area, bog is sometimes called bog relict.

Bogs are usually composed of a dynamic mosaic of several distinct, successionally-related plant communities. These usually include *Sphagnum* sedge mat, bog meadow, shrub carr, tamarack swamp forest, inundated shrub swamp, and

FIGURE 9. Aerial photograph of LeFevre Bog, Climax Tp. (photo courtesy of Clayton Alway). This lacustrine fringe bog is unique in Kalamazoo County in having a floating "mat" of vegetation that entirely encircles the "eye" of the bog (a classic "kettle-bog"). This photo was taken in summer 1981. Since then, a fishing pond has been built near the bog, and fill has been dumped onto part of the bog mat.

red maple swamp forest (locally). Only shrub carr, tamarack swamp forest, inundated shrub swamp, and red maple swamp forest, are further treated separately since significant remnants of these communities exist outside of bogs in Kalamazoo County.

The *Sphagnum* sedge mat usually occurs near open water and is quite wet. Some typical plants include *Calopogon tuberosus, Carex lasiocarpa, Decodon verticillatus, Drosera rotundifolia, Liparis loeselli, Sarracenia purpurea, Vaccinium oxycoccus,* and *Xyris difformis.*

Bog meadow is closely allied to the *Sphagnum* sedge mat, but is usually not as wet or species-rich. Some typical plants include *Carex limosa, C. oligosperma, Chamaedaphne calyculata, Cypripedium acaule, Larix laricina, Platanthera ciliaris, Pogonia ophioglossoides, Rhynchospora alba, Toxicodendron vernix, Vaccinium macrocarpon,* and *Woodwardia virginica* (Brewer 1966a; Keough & Pippen 1981; Swinehart & Parker 2000).

Acer rubrum, Cornus amomum, Toxicodendron vernix, and *Vaccinium spp.* are often locally abundant, especially in and near the bog moat (sometimes called the lagg) at the upland/wetland interface.

Areas within bog that are dominated by heavy shrub growth including such

species *as Cornus amomum*, *Rosa palustris,* and *Sambucus canadensis,* are sometimes called shrub-carr (see below).

Since few data are available describing the hydrology, patterning, nutrient status, pH, peat depth, and other characteristics of Kalamazoo County bogs, I do not recognize variants in the annotated checklist; however, at least three variants are apparent when one considers landscape position.

1. ***Lacustrine fringe:*** Occasional on the borders of more or less oligotrophic lakes and ponds. These bogs typically exhibit relatively high plant species richness and distinct zonation, often including a moat at the upland/wetland interface, a shrub and tamarack zone, and bog meadow and a sedge-*Sphagnum* floating mat adjacent to open water.
2. ***Riverine fringe:*** bordering a river or stream. Water characteristically flows through the acidic substrate. Several large and unusual bogs border Flowerfield Creek in Prairie Ronde Tp. near the intersections of YZ Ave. and 4th St., and YZ Ave. and 5th St. They are difficult to characterize because their floras are poorly-known, but they appear to exhibit low to moderate plant species richness relative to other bog variants.
3. ***Seepage:*** Bog sometimes intergrades with fen along lakeshores in Kalamazoo County, probably owing to local variations in water and mineral input, water levels, and peat accumulation. These patchy wetlands are usually located at the margins of mildly eutrophic lakes. Portions of these complex wetlands are often dominated by shrub carr, characteristically including *Betula pumila,* and invasive exotics and aggressive natives such as *Lythrum salicaria*, *Phragmites australis,* and *Typha* spp. (probably resulting at least in part from hydrologic manipulation, fire suppression, and eutrophication). Despite the often heavy growth of shrub carr, they are usually quite species rich. A few nice examples of seepage bog occur in the Gourdneck State Game Area (Gourdneck SGA).

Bishop's Bog (approximately 70 acres in section 28 of Portage Tp.) is close to what some classifications call poor fen but probably is closest to lacustine fringe bog in the above classification despite the numerous ways in which it differs from other members of this class. It appears to have been subject to occasional fires owing to the fire damaged trunks of tamarack scattered throughout the bog.

Fen (FEN) Figures 10–11. Fen is usually characterized by having groundwater rich in magnesium and calcium flowing from springs and percolating through the organic muck, marl, and/or sedge peat substrate. Many Kalamazoo County fens are located in outwash alongside lakes and streams. Fens are usually composed of a mosaic of several sucessionally-related plant communities including fen meadow, shrub carr, fen sedge meadow, and tamarack swamp (only shrub carr and tamarack swamp are treated seperately below and in the annotated checklist) (Albert & Comer 1999).

Fen sedge meadow usually occurs in wet depressions near lake or stream margins and springs. Some typical plants include *Arnoglossum plantagineum,*

FIGURE 10. Fen sedge meadow at Paw Paw Lake (Texas Tp.) dominated by *Arnoglossum plantagineum* (white flowers), just as it was more than 50 years ago when admired by the Haneses (R. W. Pippen pers. comm. 1996). Photographed in early July.

Calopogon tuberosus, Carex buxbaumii, C. lasiocarpa, C. prairea, Cladium marsicoides, Eleocharis rostellata, Liatris spicata, Liparis loeselii, Lobelia kalmii, Parnassia glauca, Platanthera dilatata, Potentilla palustris, Sarracenia purpurea, Scirpus acutus, Tofieldia glutinosa, Triglochin maritimum, and *Utricularia intermedia*.

Fen meadow is closely allied to sedge meadow, but is not as wet. Some typical plants of fen meadow include *Calamagrostis canadensis, Carex aquatilis, C. stricta, Cypripedium candidum, Phalaris arundinacea, Potentilla fruticosa*, *Saxifraga pensylvanica, Valeriana uliginosa,* and sometimes prairie grasses and forbs such as *Andropogon gerardii, A. scoparius, Panicum virgatum, Silphium integrifolium, Sorghastrum nutans, Spartina pectinata, Sporobolus heterolepis, Veronicastrum virginicum,* and others. Most Kalamazoo County fens can be accurately called "prairie fens" since they exhibit significant tallgrass prairie floras (Penskar & Higman 2000; Sytsma & Pippen 1981a, 1981b, 1982a, 1982b, 1982c).

Areas dominated by shrub growth are usually called shrub carr (see separate treatment for shrub carr). Areas with tree growth are usually dominated by tamarack and may occasionally be densely wooded enough to be called tamarack swamp forest. Several distinctive variants of fen occur in Kalamazoo County but are not elaborated here.

Fens are the most species-rich plant communities remaining in Kalamazoo County, and are the only relatively intact plant community in which several

FIGURE 11. Aerial view (summer 1981) of a prairie fen at Hogset Lake in the Gourdneck SGA (Schoolcraft Tp.) (photo courtesy of Clayton Alway). Notice how shrubs and trees have colonized the slightly drier rises in the fen meadow at the bottom of the photo, replacing plants such as *Cypripedium candidum* and *Potentilla fruticosa* which were once common here (Hanes & Hanes 1947; pers. obs.). Much additional shrub growth has occurred at this site since this photograph was taken. The fen sedge meadow which is very clearly seen in the top center of this picture is now almost completely covered in shrubb-carr (pers. obs. 1996–1997).

former prairie plants persist. Fens occasionally contain local concentrations of bog plants (such as *Pogonia ophioglossoides* and *Vaccinium* spp.) due to local variation in substrate conditions, and can intergrade with seepage bog which characteristically contains local concentrations of fen plants (see bog). Fires were once an important factor affecting floristic composition and vegetation structure in fens (Albert & Comer 1999).

Wet Prairie (WET-PRAIRIE) Figures 12–13. Wet prairie characteristically occurred in shallow depressions, usually near streams, on seasonally inundated, level, saturated loam, silt loam, or rarely muck, with variable pH. Fire was once an important natural process. The one relatively intact site from which data are available (no longer extant) may have been close to wet-mesic in nature since it included many more prairie plants than some other extant and wetter (but more disturbed) sites (Brewer 1965). Some plants found in the aforementioned former relatively intact remnant, and in other remnants include *Andropogon gerardii, Apios americana, Apocynum cannabinum, Aster novae-angliae, A. oolentangiensis, A. sagittifolius, Calamagrostis canadensis, Carex bebbii, Cicuta maculata, Cirsium muticum, Comandra umbellata, Coreopsis tripteris, Eryngium yuccifolium*, *Eupatorium maculatum, Cornus racemosa, Equisetum arvense, Fragaria virginiana, Galium boreale, Gentiana andrewsii, Geranium macula-*

FIGURE 12. Disturbed streamside wet and wet-mesic prairie in Schoolcraft Tp. photographed in August.

FIGURE 13. Close-up of relatively intact and unplowed wet prairie/bur oak savanna (perhaps wet-mesic) ground cover within the right-of-way of the former MI Central RR near the WMU campus and Stadium Drive. This prairie was mostly covered by fill from 1962–1964 during the relocation and improvement of part of Stadium Drive (see Brewer 1965). Most of the remaining prairie has since been overgrown by shrubs and trees. Nothing like it remains in Kalamazoo County. This photograph was published in Brewer (1965). It is possible to make out several prairie plants in the photo, including *Andropogon gerardii, Aster sagittifolius, Eryngium yuccifolium, Galium boreale,* and *Spartina pectinata.* Brewer (1965) provides a nice quantitative ecological analysis of the structure and composition of this former prairie.

tum, Helianthus decapetalus, Heuchera richardsonii, Iris virginica, Larix laricina, Liatris spicata, Monarda fistulosa, Onoclea sensibilis, Panicum leibergii, Populus tremuloides, Pycnanthemum virginianum, Ratibida pinnata, Saxifraga pensylvanica, Silphium integrifolium, Smilacina racemosa, Solidago altissima, S. canadensis, S. gigantea, S. riddellii, S. rigida, Spartina pectinata, Thalictrum dasycarpum, Thelypteris palustris, Tradescantia ohiensis, Typha latifolia, Vernonia missurica, Veronicastrum virginicum, and *Zizia aurea* (Brewer 1965).

The resemblance of wet prairie to prairie fen is unmistakable. A few present day wet meadows may have once supported small areas of wet prairie. In some areas, wet prairie may have replaced tamarack swamp forest. Since few data are available describing Kalamazoo County wet prairies, I do not formally recognize variants in the annotated checklist; however, several variants are apparent, perhaps most notably, those in sandy situations and those in the floodplain of the

Kalamazoo River. Some interesting plants known only or primarily from sandy wet prairies include *Aletris farinosa*, *Agalinis gattingeri* (extinct), *Platanthera ciliaris* (no longer extant in this habitat), *Scleria triglomerata* (possibly extinct), and *Viola lanceolata*.

A few small wet prairie remnants persist in Kalamazoo County; however, most are dominated by shrubs and exotic grasses due to fire suppression and frequent disturbance (especially grazing). One of the best remaining remnants is located between Stadium Dr. and the Amtrak RR right-of-way just SW of Howard St., W of the WMU campus within the right-of-way of the former Michigan Central RR, established in 1847 (MI Central RR). This site has a relatively rich prairie flora and would likely benefit from management. It is possible that with careful study other potentially recoverable remnants may be identified in Kalamazoo County. Brewer (1965) offers considerable insight into the floristic composition of a relatively undisturbed former wet prairie.

Shrub Dominated Wetland **(Figure 4)**

Inundated Shrub Swamp (SHRUB-SWAMP). Inundated shrub swamp is a shrub-dominated successional plant community intermediate between emergent marsh and swamp forest. Characteristically, the substrate is deeply inundated muck or occasionally, mineral soil. Inundated shrub swamp is frequently found in bog moats and locally in fen, but also occurs in other wet depressions such as in oxbow lakes, and ponds (esp. kettle holes), etc. There are several unique and predictable variants of inundated shrub swamp in Kalamazoo County, but none are sufficiently well-known or common enough to warrant separate treatment. In a broad sense, most inundated shrub swamps could probably be treated as components of other plant communities (bog, fen, floodplain forest, etc.). Taken as a whole some typical plants include *Alisma plantago-aquatica, Calla palustris, Cephalanthus occidentalis, Cornus amomum, C. stolonifera, Echinocystis lobata, Glyceria septentrionalis, Impatiens capensis, Juncus acuminatus, Leersia oryzoides, Lemna minor, Lycopus americanus, Penthorum sedoides, Polygonum arifolium, P. sagittatum, Ranunculus flabellaris, Rumex* sp., *Salix bebbiana, S. discolor, Scirpus atrovirens, Sparganium chlorocarpum, Typha latifolia*, and *Veronica scutellata* (Tyrrell 1987).

Shrub-Carr (SHRUB-CARR). Shrub carr usually forms a dynamic patchwork over the surface of fen, bog, wet meadow, and other wetland plant communities. Soil is usually saturated peat or muck, and the pH is variable. Shrub carr is a successional phase of vegetation favored by fire suppression, hydrologic manipulation, eutrophication, and other disturbances. Shrub carr is treated separately here since it has come to occupy a significant proportion of Kalamazoo County wetlands. In a broad sense, all shrub carr could probably be treated as a component of other plant communities (bog, fen, wet prairie, etc.). Taken as a whole, some typical plants include *Acer rubrum, Aster lanceolatus*, *Betula pumila, Calamagrostis canadensis, Cornus stolonifera, Eupatorium perfoliatum, Impatiens capensis, Onoclea sensibilis, Populus tremuloides, Salix discolor*, *S. bebbiana*, *Spiraea alba*, *Symplocarpus foetidus,* and *Toxicodendron vernix* (Sytsma & Pippen 1981b; 1982a; 1982b).

Forested Wetland **(Figure 5)**
A diversity of forested wetlands fall into this category, and it is possible to separate them into a multitude of variants. Taken as a whole they are often simply called, "swamp forests". To avoid splitting hairs I recognize just a few of the more common variants below and in the annotated checklist:

1. **Tamarack Swamp Forest.** Usually in mucky seepage areas, often associated with fen or bog.
2. **Pin Oak Swamp Forest** (not separated from Hardwood Swamp Forest in the annotated checklist). Usually on peaty, acid sand and locally dominated by Pin Oak, Black Oak, and Black-gum (this community is rare and little-known).
3. **Red Maple Swamp Forest.** Usually on acid substrates near lakeshores (often associated with bog) and with a well-developed shrub layer. Forests with White Pine and/or Tamarack mixed with Red Maple and other swamp forest species are sometimes segregated under the name of mixed hardwood-conifer swamp forest. However, relatively little such forest occurs in Kalamazoo County. Where it does occur, it typically dominates areas near lake edges, and intergrades with red maple swamp forest. Since it is relatively rare, and usually associated with red maple swamp forest, I have chosen not to treat it separately here.
4. **Black Ash Swamp Forest.** Usually at the edges of wooded uplands near streams and lakes where nutrient rich groundwater seepage saturates the muck substrate.
5. **Hardwood Swamp Forest.** Usually in depressions along streams and creeks such as in much of Wakeshma Tp.
6. **Floodplain Forest.** Known only from the floodplain of the Kalamazoo River and along part of August Creek.

Tamarack Swamp Forest (TAMARACK-SWAMP). Tamarack swamp forest is found mostly in glacial outwash and kettle depressions, but large stands also once occurred immediately N and E of the city of Kalamazoo along the Kalamazoo River. The substrate is usually saturated organic muck with variable pH (Sytsma & Pippen 1982a). The most notable characteristic is that the forest canopy is usually dominated by tamarack. Larch sawfly populations, flooding/drought, fire, and other natural processes are/were probably important factors affecting the floristic composition and structure of this community (in addition to variation in substrate conditions). Some typical species include *Acer rubrum, Betula pumila, Cypripedium calceolus, Larix laricina, Maianthemum canadense, Symplocarpus foetidus, Toxicodendron vernix, Trientalis borealis, Trillium flexipes,* and *Ulmus americana* (Sytsma & Pippen 1982a). Floristic composition seems to vary depending upon the amount and PH of groundwater seepage, but relatively little is actually known about the flora of remaining remnants, except that some sites mapped as this community type in Figure 5, now resemble red maple swamp forest, having apparently lost much of their former tamarack. The Haneses (1947) noted that tamarack was declining at a number of former sites. Some of the most intact, extensive, and species-rich remnants of

tamarack swamp forest are located near Flowerfield Creek (Prairie Ronde Tp.). Several bogs and fens support small, and unique stands of tamarack swamp forest. Little of this plant community remains in Kalamazoo County.

Red Maple Swamp Forest (RED-MAPLE-SWAMP). Red maple swamp forest is nearly restricted to saturated muck substrates at stream headwaters (such as near Flowerfield Creek in Prairie Ronde Tp.) and mucky peat substrates in outwash depressions (such as around the Sugarloaf Lakes & Goose Lake) primarily in Schoolcraft and Prairie Ronde Tps. White Pine, Black Ash, and Red Maple, are locally the dominant trees. Other typical plants include *Betula alleghaniensis, Coptis trifolia, Cypripedium calceolus, Dryopteris cristata, Ilex verticillata, Larix laricina, Lindera benzoin, Maianthemum canadense, Nemopanthus mucronata, Osmunda cinnamomea, O. regalis, Platanthera clavellata* (only in Prairie Ronde and Schoolcraft Tps.)*, Poa paludigena, Rubus pubescens, Symplocarpus foetidus, Toxicodendron vernix, Trientalis borealis, Trillium flexipes, Ulmus americana, Vaccinium corymbosum,* and *Viburnum lentago*. Red maple swamp forest may be successionally related to white-pine-dominated wetlands (probably resembling an open marshy pine forest) observed by the GLO surveyors in southern Schoolcraft Tp (Comer et al. 1997; Comer & Albert 1995). White-pine-dominated wetlands may have resulted from occasional or catastrophic fire in areas otherwise dominated by red maple swamp forest or tamarack swamp forest. Today, white pine is a locally important component of red maple swamp forest in Kalamazoo County.

Black Ash Swamp Forest (ASH-SWAMP). Black ash swamp forest is a relatively local but distinctive plant community usually replacing tamarack swamp forest or mixed hardwood swamp forest where nutrient rich groundwater seepage saturates the substrate. Some typical plants include *Acer rubrum, Asarum canadense, Fraxinus nigra, Lindera benzoin, Mitchella repens, Symplocarpus foetidus, Trientalis borealis, Trillium flexipes*, *Ulmus americana,* and *Zanthoxylum americanum*. Black ash swamp forest is not well known in Kalamazoo County.

Mixed Hardwood Swamp Forest (HARDWOOD-SWAMP). Mixed hardwood swamp forest usually occurs in wet depressions, often along streams. Soils are diverse in Kalamazoo County but regardless of their nature are almost always inundated in the spring. The forest canopy is usually dense. Trees are often shallow-rooted and prone to wind-throw, creating tree-fall gaps and a rather uneven forest floor. Typical plants include *Acer rubrum, A. saccharinum, Carex tribuloides, C. vulpinoidea, Fraxinus nigra, F. pensylvanica, Juglans cinerea*, *Laportea canadensis, Parthenocissus quinquefolia, Pilea pumila, Platanus occidentalis, Populus deltoides, Quercus bicolor, Symplocarpus foetidus, Toxicodendron radicans,* and *Ulmus americana*. Elm blight has much reduced the dominance of *Ulmus americana*. *Phalaris arundinacea* is a good indicator of disturbance. *Gymnocladus dioicus* is an occasional element of mixed hardwood swamp forest in the SE¼ of the county, especially in northern Wakeshma Tp.

Floodplain Forest (FLOODPLAIN-FOREST). Floodplain forest is found on loam or silt loam with a neutral pH, only on the floodplains of Augusta Creek and the Kalamazoo River. Floodplain forests are host to many rare and habitat-restricted species and are relatively little-studied in Kalamazoo County. Some typical plants include *Acer negundo, A. saccharinum, Arisaema dracontium, Asarum canadense, Celtis occidentalis, Cercis canadensis, Euonymus atropurpurea* (now rare and local)*, Fraxinus nigra, F. pennsylvanica, Gleditsia triacanthos, Juglans cinerea* (now rare), *Lindera benzoin, Lobelia cardinalis, Osmunda cinnamomea, O. regalis, Parthenocissus* spp., *Platanus occidentalis, Quercus bicolor, Q. muhlenbergii* (on moist levees)*, Symplocarpus foetidus, Ulmus americana*, and *U. rubra* (more common prior to elm blight). *Populus deltoides* and *Salix nigra* are often found in former channels and along low riverbanks (Meagher & Tonsor 1992).

B. Terrestrial

***Terrestrial Prairie* (TERRESTRIAL-PRAIRIE) Figures 6, 14, 15.**

Prairie plant communities once formed a conspicuous and significant feature of the Kalamazoo County landscape. They once covered approximately 21,584.1 acres (P. Comer pers. comm.). The former terrestrial prairies of Kalamazoo County were probably a dynamic patchwork of dry, dry-mesic, mesic, wet-mesic, and wet seasonal microclimates. Unfortunately, we do not know enough about the flora or hydrology of these former prairies to effectively classify most of them in this way. Further, the hydrology of these former prairies is probably not well-represented by the few very small and seriously altered extant remnants due to significant changes in local and regional water tables. Therefore, I have chosen to recognize all terrestrial prairies under the one name, *terrestrial prairie*. Numerous sources have been consulted in preparing this section. Some of the most frequently consulted publications, and others that may be of general interest to the reader include; Anderson 1990; 1983; Brewer 1985; 1984; Brewer et al. 1969; Chapman 1984; Chapman & Pleznac 1982; Cremin & DeFant 1987; Cremin & Quattrin 1987; Curtis 1959; Hanes 1947; Gleason 1913; Thompson 1975; Transeau 1935; Veatch 1928.

Terrestrial prairie occurred mostly on glacial outwash plains and in smaller patches on other landforms. Soils were usually sandy loam or loam. Prairies were probably maintained in large part by fires set by Native Americans (Cremin & DeFant. 1987; Cremin & Quattrin 1987). Sugar maple forest (see below) often developed where natural features served as firebreaks near former terrestrial prairies. The origin and age of these former prairies is unknown, however, the French explorer Rene Robert Cavelier, Sieur de La Salle passed through what may have been Gull Prairie in 1680 (Woodruff 1999). One of several hypotheses is that terrestrial prairies were formed through the destruction of forest by fire. Others suggest that the large former prairies such as Prairie Ronde, may have formed from post-glacial marshes. I am aware of no convincing data to support or refute either hypothesis or to suggest plausible alternative scenarios. It is interesting to note that the Haneses (1947) collected *Claytonia virginica* from several roadsides well within the former Prairie Ronde. Richard Brewer found *Hepatica americana* (though possibly a waif) growing along the MI Central RR

FIGURE 14. Unplowed fencerow and cemetery on Prairie Ronde (Prairie Ronde Tp.) photographed in mid-summer. Note the single flowering *Baptisia lactea* in the fencerow. *Silphium integrifolium* occurs nearby but cannot be seen in this photo. This is a former site for *Cirsium hillii*, and is host to one of just a few remaining extant populations of *Ranunculus fascicularis* and *Viola pedatifida* in Kalamazoo County.

FIGURE 15. Terrestrial prairie fencerow relict on Gourdneck Prairie (Schoolcraft Tp.) photographed in August with *Silphium integrifolium* and *Coreopsis tripteris*.

right-of-way through the northern border of Genesee Prairie (Brewer 1984, 1985). Although perhaps inconsequential, both species are typical spring wildflowers in many Kalamazoo County terrestrial forests.

Dominant terrestrial prairie plant species are mostly uncertain, but grasses including *Andropogon gerardii, A. scoparius, Panicum virgatum, Stipa spartea,* and *Sorghastrum nutans,* may have been the most abundant, and were probably local dominants. Mesic and dry-mesic prairies were probably the most widespread kinds of terrestrial prairie at the time of the GLO surveys. While they may have been droughty in summer and fall, I suspect that most were locally quite wet in the spring, with significant areas of standing water.

Anecdotal accounts by early settlers provide a glimpse of what these prairies were like.

"The prairie . . . seemed wondrously beautiful and grand. It was simply in a state of nature, covered with a pretty rank growth of grass, then [6 November 1831] *dry and sere, no tree except the Big Island Grove ("Island Woods"), and one or two other small groves . . . . Early in March the rank growth of last year's grass, dried by the sun and wind, was set on fire, and the whole prairie burned over, leaving it bare and black as midnight. Then in a few days came the beautiful flowers, covering the whole prairie with one uniform kind and color; first, the blue violet* [Viola pedatifida]*, then the purple phlox* [probably Phlox pilosa]*, and this succeeded by some other color. In July and August a tall, yellow flower, the name of which I do not know* [probably Silphium integrifolium]*, mixed profusely with the tall grass* [probably Andropogon gerardii]*, gave yellow as the predominating color. . . . But all was wild, with a peculiar, rank, sick smell, that even now almost brings back the shivers of the ague* [recurring fever & chills caused by malaria]*."* (Brown, 1881, describing Prairie Ronde and Gourdneck Prairie).

"Ascending slightly from circumference to the center, yet so as to seem full rather than elevated; surrounded with a noble forest whose sharp-cut and perfect line was nowhere so distant as to be indistinct, yet so remote that the beams of the rising and setting sun seemed to blend in a mist of gold and purple . . . the whole plain was covered from spring to autumn with a gorgeous array of flowers, whose differing colors followed each other in due succession; at last faded and gone in the autumn winds" . . . . (Van Buren 1888, describing Prairie Ronde, as quoted in Chapman 1984).

"I went out to Gull Prairie in the spring of [18] *'33 with J. F. Gilkey; the prairie had been burnt over in the fall and the fresh green grass and the thousand wildflowers made it seem like a great garden.* (Turner 1911, describing Gull Prairie).

". . . beneath, about, and beyond me, as far as the eye could reach, was spread out, in undulating elegance, an emerald carpet of nature's choicest fabric, inlaid profusely with flowers of every imaginable variety of name and tint—gorgeous and fascinating as the most brilliant hues of the rainbow." (Taylor 1855 describing Grand Prairie, as quoted in Chapman 1984).

"To get an idea of Prairie Ronde, the reader must imagine an oval plain of some five-and-twenty or thirty thousand acres in extent, of the most surprising fertility, without an eminence of any sort; almost without an inequality. There are a few small cavities, however, in which there are springs forming large pools of

water that the cattle will drink. This plain, so far as we saw it, is now entirely fenced and cultivated. The fields are large—many containing eighty acres, and some one hundred and sixty; most of them being in wheat. We saw several fields of this size in that grain. Farm-houses dotted the surface, with barns, and the other accessories of rural life. In the center [sic] of the prairie is an "island" of forest [the Haneses "Island Woods" is today an unplowed 24 acre remnant of this forest]*, containing some five or six hundred acres of the noblest native trees we remember ever to have seen. In the center [sic] of this wood is a little lake, circular in shape, and exceeding a quarter of a mile in diameter* [the Haneses (1947) "Island Pond"]. *The walk in this wood, which is not an opening, but an old-fashioned virgin forest, we found delightful of a warm summer's day"* (Cooper 1848).

It is interesting to note that in the above passages, mention is made of burning Gull Prairie in the fall, and Prairie Ronde in the spring. It is not known exactly how often, and during what season of the year these prairies were traditionally set fire, but clearly fire was an exceeding important element of prairie ecology.

Early settler accounts, first botanical survey collections (Appendix I), and floristic inventories of disturbed terrestrial prairie remnants (including plants presumably persisting as relicts) suggest that some plants included were: *Ambrosia artemisiifolia, Amorpha canescens, Anemone cylindrica, Antennaria neglecta, Arenaria stricta, Artemisia caudata, Asclepias amplexicaulis, A. incarnata, A. tuberosa, A. verticillata, A. viridiflora, Aster ericoides, A. laevis, A. novae-angliae, A. oolentangiensis, A. pilosus, A. sericeus, Astragalus canadensis, A. neglectus, Baptisia lactea, B. leucophaea, Bouteloua curtipendula, Calamagrostis canadensis, Carex bicknellii, C. muhlenbergii, Cirsium discolor, C. hillii, Claytonia virginica, Comandra umbellata, Coreopsis palmata, C. tripteris, Corylus americana, Desmodium sessilifolium, Digitaria filiformis, Dioscorea villosa, Echinacea purpurea, Erigeron annuus, Eryngium yuccifolium, Euphorbia corollata, Geranium maculatum, Hedeoma hispida, Helianthus lateriflorus, H. occidentalis, H. strumosus, Krigia biflora, Kuhnia eupatorioides, Lespedeza capitata, Liatris punctata, Lithospermum canescens, Monarda fistulosa, Panicum leibergii, P. oligosanthes, P. perlongum, P. virgatum, Penstemon pallidus, Phlox bifida, P. pilosa, Platanthera lacera, Poa pratensis, Potentilla arguta, Pycnanthemum tenuifolium, Quercus macrocarpa, Ranunculus fascicularis, Ratibida pinnata, Rhus glabra, Rubus hispidus, Rosa setigera, Salix humilis, Scleria triglomerata, Silphium integrifolium, Sisyrinchium albidum, Solidago altissima, S. juncea, S. missouriensis, S. nemoralis, S. rigida, S. speciosa, Spartina pectinata, Specularia perfoliata, Sporobolus heterolepis, Taenidia integerrima, Thalictrum dasycarpum, Thaspium trifoliatum, Tradescantia ohiensis, Verbena stricta, Veronicastrum virginicum, Vicia americana, Viola pedatifida, V. sagittata, V. sororia,* and *Zizia aurea*.

The Haneses and subsequent collectors made many interesting botanical collections from along RR rights-of-way and roadsides through former prairies, especially through the former Prairie Ronde and Gourdneck Prairie. Some of these collections are of typically more southern and/or western prairie and savanna plants that are often thought to be adventive here. It is important to note however, that relatively few such species are known from non-prairie RR rights-of-

way and while certainly some of these purported waifs were probably never native in Kalamazoo County, some of them probably were. Some examples of such plants of uncertain status (native or adventive?) in the Kalamazoo County flora include: *Adlumia fungosa, Crotalaria sagittalis, Echinacea pallida, Glyceria acutiflora, Helianthus hirsutus, H. maximiliani, H. petiolaris, Parthenium hispidum, Phlox bifida, Silphium laciniatum, S. perfoliatum, Sporobolus asper,* and *Stipa comata*.

The following tables are a compilation of native prairie plants known from within the boundaries of 5 large former Kalamazoo County terrestrial prairies (See Figure 6 & Tables 5–9). Several of these species are reported based on collections made by the first botanical survey (Appendix I), others were collected much later, often along roadsides and/or RR rights-of-way. I have not included species that I strongly believe to be adventive. I have only indicated the source(s) for each report when not based on specimens in the WMU herbarium, specimens collected by the first botanical survey, or personal observations I made between 1994 and 2002. As such, these lists should be considered my subjective opinion. Other than palynological and phytolith studies, little else remains to further elucidate the relatively unknown former floras of these prairies. Many more plant species than are presented here have been collected from within the boundaries of the following prairies; however, most are exotics, weedy natives, or adventive. All of the following are, in my opinion, potentially native prairie species.

TABLE 5. Plants known from Genesee Prairie

Achillea millefolium
Ambrosia artemisiifolia
Andropogon gerardii
Andropogon scoparius
Angelica venenosa (Brewer 1984)
Anemone virginiana
Antennaria parlinii
Apocynum cannabinum
Arenaria stricta
Asclepias tuberosa
Aster laevis (Brewer 1984)
Aster pilosus (Brewer 1984)
Aster sagittifolius
Carex bicknellii
Carex pensylvanica
Ceanothus americanus (Brewer 1984)
Cirsium hillii (pers. obs.)
Comandra umbellata
Coreopsis tripteris
Cornus racemosa
Corylus americana
Desmodium canadense
Dioscorea villosa
Draba reptans (Brewer 1984)
Elymus canadensis
Euphorbia corollata
Euthamia graminifolia
Fragaria virginiana
Galium boreale
Geranium maculatum
Hepatica americana (Brewer 1984)
Heuchera richardsonii (Brewer 1984)
Lathyrus venosus
Liatris aspera (Brewer 1984)
Liatris scariosa
Lysimachia quadrifolia
Monarda fistulosa
Panicum leibergii (Brewer 1984)
Phlox pilosa
Physalis sp.
Polygonatum biflorum
Potentilla arguta (Brewer 1984)
Potentilla simplex
Prenanthes alba
Pteridium aquilinum
Ranunculus fascicularis (Brewer 1984)
Ratibida pinnata
Rhus glabra
Rhus typhina
Rosa carolina
Rudbeckia hirta
Salix humilis
Silphium integrifolium
Smilacina racemosa
Solidago canadensis
Solidago gigantea
Solidago juncea
Solidago nemoralis
Solidago rigida
Sorghastrum nutans
Sporobolus cryptandrus
Symphoricarpos orbiculatus (Brewer 1984)
Taenidia integerrima
Thalictrum dioicum
Tradescantia ohiensis
Veronicastrum virginicum
Vicia americana

TABLE 6. Plants known from Gourdneck Prairie

Andropogon gerardii	*Baptisia lactea*	*Kuhnia eupatorioides*
Asclepias viridiflora	*Carex bicknellii*	*Panicum virgatum*
Asclepias tuberosa	*Coreopsis palmata*	*Phlox pilosa*
Aster ericoides	*Coreopsis tripteris*	*Ratibida pinnata*
Aster novae-angliae	*Elymus canadensis*	*Silphium integrifolium*
Aster ontarionis	*Eryngium yuccifolium*	*Solidago missouriensis*
Aster pilosus	*Euphorbia corollata*	*Specularia perfoliata*
Aster sericeus	*Helianthus strumosus*	*Viola pedatifida*
Aster umbellatus	*Krigia biflora*	

TABLE 7. Plants known from Grand Prairie

Andropogon gerardii	*Asclepias viridiflora*	*Bouteloua curtipendula*
Arenaria stricta	*Baptisia lactea*	*Linum sulcatum*
Asclepias tuberosa	*Baptisia leucophaea*	*Scleria triglomerata*

TABLE 8. Plants known from Gull Prairie

Andropogon gerardii	*Echinacea purpurea*	*Potamogeton pectinatus*
Asclepias tuberosa	*Elymus canadensis*	*Silphium integrifolium*
Coreopsis palmata	*Krigia biflora*	*Veronicastrum virginicum*
Coreopsis tripteris	*Kuhnia eupatorioides*	*Viola pedatifida*

TABLE 9. Plants known from Prairie Ronde

Amorpha canescens	*Desmodium illinoense*	*Pycnanthemum tenuifolium*
Andropogon gerardii	*Elymus canadensis*	*Ranunculus fascicularis*
A. scoparius	*Erigeron annuus*	*Ratibida pinnata*
Artemisia caudata	*Eryngium yuccifolium*	*Rosa setigera* (in the "Island" woods)
Asclepias amplexicaulis	*Euphorbia corollata*	*Salix humilis*
Asclepias tuberosa	*Helianthus occidentalis*	*Scrophularia lanceolata*
Asclepias verticillata	*Helianthus strumosus*	*Silphium integrifolium*
Asclepias viridiflora	*Krigia biflora*	*Silphium perfoliatum* (poss. adventive)
Aster ericoides	*Kuhnia eupatorioides*	*Sisyrinchium albidum*
Aster novae-angliae	*Lechea minor*	*Solidago juncea*
Aster ontarionis	*Lespedeza capitata*	*Solidago nemoralis*
Aster pilosus	*Liatris punctata*	*Sorghastrum nutans*
Aster sericeus	*Lithospermum canescens*	*Spartina pectinata*
Astragalus canadensis	*Panicum virgatum*	*Specularia perfoliata*
Astragalus neglectus	*Panicum philadelphicum*	*Stipa spartea*
Baptisia lactea	*Penstemon pallidus*	*Teucrium canadense*
Baptisia leucophaea	*Phlox bifida* (poss. adventive)	*Thaspium trifoliatum*
Carex bicknellii	*Phlox pilosa*	*Veronicastrum virginicum*
Cirsium hilli	*Platanthera lacera*	*Viola pedatifida*
Claytonia virginica	*Polygala senega*	*Zizia aurea*
Coreopsis palmata	*Potentilla arguta*	
Corylus americana	*Potentilla anserina*	

Terrestrial Shrub/Savanna **(Figure 6)**

Savannas have an open canopy and are usually maintained by fire (Comer et al. 1997; Comer et al. 1995). Oaks, especially *Q. alba*, *Q. velutina*, *Q. macrocarpa,* and *Q. prinoides* were/are important. The division of oak savannas into variants is difficult since only a very few small remnants remain. Thus, like prairies, much of what we presume to know about savannas comes from small, highly altered sites, accounts by early settlers, and notes from the GLO surveys (Anderson 1983; Archambault et al. 1990; 1989; Beal 1902; Chapman 1984; Chapman & Pleznac 1982; Legge et al. 1995; Minc & Albert 1990; Peters 1970; Whitford 1976; Wing 1937). Relatively little is known about the pre-European settlement floras and natural history of different kinds of savanna. There is now (and probably always has been) considerable local variation in the floristic composition of Kalamazoo County savannas.

I often use the catch-all term oak savanna in this flora when more detail is not available and/or practical. Uncultivated or otherwise relatively intact former oak savanna has all succeeded to oak hardwood forest except where disturbance has helped maintain an open forest canopy. Savanna-like plant assemblages often occur at degraded former sites such as along old RR rights-of-way, in pastures, and in old fields that are undergoing regeneration to oak hardwood forest. Thus, when the terms oak savanna or oak hardwood forest are used in this flora, the reader should be aware that the distinction is not today altogether clear, especially since many sites have complex and varied disturbance histories. Further, some of the small remnants that serve as the basis for reporting of plants from oak savanna in the annotated checklist are called oak savanna only because they once were oak savanna, and today retain (at least locally) portions of their presumed former floras. They may otherwise have relatively closed canopies or may lack canopy cover entirely due to past cultivation or timber harvesting. Much research remains to be done to further elucidate the degree to which sites with various cover types and disturbance histories will recover under different management regimes.

Black Oak Barren (BLACK-OAK-BARREN) Figures 16–17. Black oak barren is a variant of savanna usually found on undulating, well-drained sand or sandy loam. Black oak barren once covered approximately 40,240.5 acres (P. Comer pers. comm. 1997). It was maintained primarily by fire and perhaps to a much lesser extent by drought, but most Kalamazoo County oak barrens were probably not burned every year. Prior to settlement, most BLACK-OAK-BARREN probably was composed of a mosaic of scattered and clumped small trees (mostly *Quercus velutina*) and shrubs (*Ceanothus americanus, Prunus americana, P. nigra, Quercus prinoides,* young *Quercus velutina, Rhus copallina, Rubus flagellaris,* and others) in a matrix of grasses, sedges, and herbaceous plants. Due to variable topography and substrate conditions, these oak savannas are/were relatively species rich, especially the formerly extensive BLACK-OAK-BARRENs in the western half of the county. The grasses in rich secondary remnants in Oshtemo Tp. are mostly *Andropogon scoparius* and *Sorghastrum nutans*. The sedge *Carex pensylvanica* dominates below shrubs and in shady areas, especially at disturbed sites. In addition to fire, drought probably also

FIGURE 16. Reconstructed black oak barren S of the commuter lot at the intersection of Centre Street and US 131 (Portage Tp.) photographed in August.

FIGURE 17. Close-up of ground cover near a clump of small black oaks at the above site (photographed in August). Notice the abundance of *Amorpha canescens* and *Liatris aspera*.

helped maintain the open character of this plant community. Most extant remnants occur on very well-drained sites where drought and/or past cultivation, not fire, have delayed the development of oak hardwood forest. Some typical plants (in addition to the aforementioned grasses and *Carex pensylvanica*) today include *Amorpha canescens, Amphicarpaea bracteata, Apocynum androsaemifolium, Arabis lyrata, Artemisia campestris, Asclepias amplexicaulis, Aster sagittifolius, Aureolaria* spp., *Carex muhlenbergii, Ceanothus americana, Corylus americana, Euphorbia corollata, Galium boreale, Helianthemum canadense, Helianthus divaricatus, H. occidentalis, Lathyrus ochroleucus, Lespedeza capitata, L. hirta, Liatris aspera, Lupinus perennis, Monarda fistulosa, Panicum praecocius, Pteridium aquilinum, Quercus alba*, *Rhus typhina, Sassafras albidum, Solidago nemoralis, Tephrosia virginiana, Tradescantia ohioensis,* and *Viola pedata.* Ground cover by *Poa compressa* usually indicates past disturbance (Faber-Langendoen & Tester 1993; Heikens & Robertson 1994; Homoya 1994; Hutchison 1994; Kenoyer 1929; Pokora 1968).

A nice BLACK-OAK-BARREN reconstruction occurs immediately south of the commuter lot at the intersection of Centre St. and US 131 (between Angling Rd. and US 131), and a degraded but species-rich remnant occurs at the public access site on Eagle Lake. According to the Haneses, black oak barren developed at Austin and Eagle Lakes on small lakeside sand dunes (none of which appear to have been true open dunes, but rather, oak hardwood forest and black oak barren with disturbed areas of open sand). At Austin Lake these "dunes" were home to the county's only population of *Arctostaphylos uva-ursi* (since extirpated) (Hanes & Hanes 1947). The largest remaining quality remnant (mostly secondary, but very large and species rich and with some areas that probably have not been cultivated) is located along and north of the right-of-way of the former MI Central RR in extreme western Oshtemo Tp. Much of the site is currently undergoing residential development. *Amorpha canescens* is limited to portions of the former RR right-of-way that appear to have escaped cultivation. To my knowledge no other significant remnants of BLACK-OAK-BARREN remain in Kalamazoo County.

Bur Oak Savanna (BUR-OAK-SAVANNA) Figures 18–19. Bur oak savanna is a formerly widespread oak savanna type reduced perhaps to a single very small remnant with a partly intact groundcover layer near the WMU campus. It once covered approximately 7,730.8 acres (P. Comer pers. comm. 1997). This community is sometimes called "bur oak plain," "bur oak opening," "oak opening," or just "opening" (but the terms "oak opening" and "opening" usually apply to white oak savanna and can include associated prairie). Bur oak savanna once occurred almost exclusively on level to gently undulating terrain. It was often situated between prairie and white oak savanna. Bur oak is exceptionally fire-resistant, and fire appears to have played an important role in the structure and dynamics of this little-known plant community (Brewer & Kitler 1989; Veatch 1953; Wing 1937).

Early settler accounts and inventories of a few heavily disturbed remnants (only one of which is now extant) suggest that bur oak savannas were usually covered with a scattered growth of shrub to apple orchard sized trees, predomi-

FIGURE 18. Disturbed remnant bur oak savanna along the right-of-way of the former MI Central RR just W of the WMU campus (Kalamazoo Tp.). This picture, taken in mid-August, shows a striking display of flowering *Silphium integrifolium* intermixed with *Quercus macrocarpa* grubs, *Andropogon gerardii*, and several other prairie and savanna plants. This site has been disturbed by road and railway construction in the past, but to my knowledge it has never been cultivated. As of May, 2004, this site remained intact but unprotected. It is the last remaining remnant of bur oak savanna with a partially intact groundcover in Kalamazoo County. Despite being home to hundreds of plants of the state threatened *Silphium integrifolium,* and at least a few dozen plants of the state threatened *Panicum leibergii,* it will soon be destroyed by commercial development (anonymous pers. comm.).

nantly *Quercus macrocarpa* (Bur Oak), but a few *Q. velutina*, *Q. alba*, and *Carya ovata* (Brewer & Kitler 1989). Bur Oak has the ability to form "grubs"; woody underground stems with the ability to resprout following fire damage to the aboveground portion of the plant (Whitford 1976). Tree size and stem density probably varied within and between sites over time due to variation in the frequency and intensity of fires, landscape position, and other factors.

Bur oak savannas often adjoined or bordered prairies, or occurred alone in large stands sometimes called bur oak plains. Anecdotal evidence suggests that Bur Oak may have actively colonized terrestrial prairies from their edges. In fact, many of the large former terrestrial prairies show evidence of having decreased in size in the years leading up to the GLO surveys of 1826–1830. Thus, there is a chance that some of the bur oak savanna (and perhaps other kinds of savanna) in the immediate vicinity of prairies in Kalamazoo County one time or another may have been treeless terrestrial prairie.

FIGURE 19. Former bur oak savanna on the N edge of Prairie Ronde (Prairie Ronde Tp.). This even-aged stand of mostly *Quercus macrocarpa* has grown up from former grubs or small trees that once formed a savanna on the N edge of Prairie Ronde. The understory retains no typical prairie or savanna plants due to many years of mowing and lawn treatment. Many such vestiges of former oak savanna persist in Kalamazoo County. Photographed in late winter/early spring.

The ground layer in bur oak savanna was probably similar to adjacent wet-mesic to dry-mesic terrestrial prairie. What little is known about bur oak savanna is biased towards wetter sites since all relatively dry sites have been cultivated or long ago succeeded to forest. A few plants typically persisting as relicts include *Andropogon gerardii, Eryngium yuccifolium* (no longer extant in this community)*, Galium boreale, Panicum leibergii, P. virgatum, Quercus macrocarpa*, *Q. velutina, Q. alba, Ratibida pinnata, Spartina pectinata*, and *Silphium integrifolium. Corylus americana* was probably an important shrub, especially near watercourses (pers. obs.). Very little is known about the pre-European settlement state or structural diversity of this globally endangered and once relatively common plant community. A few former sites in Kalamazoo County retain at least some of their original trees, but the savanna groundcover has been mostly or entirely eliminated (Brewer & Kitner 1989; Minc & Albert 1990). The best and perhaps the only relatively intact remaining small remnant in Kalamazoo County occurs along the right-of-way of the former MI Central RR just west of the WMU campus near the advertising billboards along Stadium Dr. A few sites that have grown up into forest may warrant management.

James Fennimore Cooper's book "Oak Openings" describes the former oak

savannas including bur oak savanna. "Oak Openings" is set on Prairie Ronde, and was completed in 1848 from notes taken by Cooper at Schoolcraft, MI (on Prairie Ronde), Cooper writes:

> *. . . "like so many orchards on the summit of a gentle swell of land, on the border of a marsh, prairie, or lake . . . . The country was what is termed "rolling" . . . although wooded, it was not as the American forest is wont to grow, with tall straight trees towering toward the light, but with intervals between the low oaks that were scattered profusely over the view . . . . The trees, with few exceptions, were what is called the "burr-oak," a small variety of a very extensive genus; and the spaces between them, always irregular, and often of singular beauty, have obtained the name of "openings"; the two terms combined giving their appellation to this particular species of native forest, under the name of "oak openings" . . . the trees were of very uniform size, being little taller than pear trees . . . and having trunks that rarely attain two feet in diameter . . . in places they stand with regularity resembling an orchard, then, again, they are more scattered and less formal, while breadths of the land are occasionally seen in which they stand as copses, with vacant spaces, that bear no small affinity to artificial lawns, being covered with verdure. The grasses are supposed to be owing to the fires periodically lighted by the Indians in order to clear their hunting grounds . . . . "* (Cooper 1848).

Other accounts by early settlers of the region shed further light on the structure of this community.

> *"There is quite an idea that this village site (Kalamazoo) was a grassy plain with [a] scattering [of] bur oaks; but it was a plain covered with thick and tall hazel brush* (Corylus americana)*, so thick that I have seen a wolf jump up so as to see what caused the row he heard; and the burr oaks* [sic] *were very small, little more than grubs. There stands now on West Street* [Westnedge Ave.] *an oak perhaps two feet through, with a doctor's sign upon it, that when I lived on the spot, several years after I came here, was about the size of a whip stock after I had trimmed it into shape. There was perhaps an acre of clear ground about the mound in the park* [Bronson Park] . . . . *"* (Turner 1911).

> *. . . On the one hand stretched bur-oak plains, spread with a verdant carpet, variegated with dazzling wildflowers, without an obstacle to intercept the view for miles, save the somber trunks of the low oaks, sparsely spreading their shadows across the lawn; on the other hand arose the undulations of the white oak openings, with picturesque outlines of swells and slopes gracefully sweeping and sharply defined in the distance*. (Coffinberry 1880, describing the area in the vicinity of Nottawa-Sippi Prairie, northeast St. Joseph County, in 1825, as quoted in Chapman 1984).

White Oak Savanna (WHITE-OAK-SAVANNA) Figures 20–22. White oak savanna is a formerly widespread plant community that along with its characteristic flora is nearly extinct. White oak savannas once covered approximately 79,746.8 acres (P. Comer pers. comm.), were found mostly on dry to mesic sandy-loam and loamy-sand, and were usually located in areas of level to rolling topography, often "unhill" from bur oak savanna. This community is often called "white oak opening," "oak opening" (but the term "oak opening" also was applied to bur oak savanna and associated prairie), or just "opening." Trees were predominantly *Quercus alba* (White Oak), but *Q. macrocarpa, Q. velutina*, *Carya ovata*, and other trees were probably present in smaller numbers (pers. obs.). Tree size probably varied from site to site due to variation in the frequency and intensity of fires, drought, and other disturbances. The ground layer in this community may have shared many characteristics with terrestrial prairie, but

FIGURE 20. White oak savanna remnant along the former right-of-way of the MI Central RR. This is perhaps the finest example of white oak savanna remaining in Kalamazoo County, and is the last place in the county where *Angelica venenosa* (middle foreground) is known to occur. *Coreopsis tripteris* can also be seen in the foreground. The opening in the background is dominated by the grasses *Andropogon gerardii* and *Sorghastrum nutans*, and includes a significant and relatively unique herbaceous flora. Photographed in August. This site and an adjacent site with a similarly rich and endangered flora (including the only known extant individual of *Cirsium hillii*) were still intact as of May, 2004, but will soon be destroyed by commercial development (anonymous pers. comm.).

probably included many plants today occasional in open oak hardwood forest. White oak savannas were structurally diverse in Kalamazoo County, and the few highly altered remnants that remain reveal little about the pre-European settlement character of this plant community (Minc & Albert 1990; Veatch 1928; Whitford 1976; Wing 1937).

Taken as a whole, some typical plants of remnant white oak savanna today include; *Amorpha canescens, Andropogon gerardii, A. scoparius, Anemone cylindrica, Asclepias purpurascens, Arnoglossum atriplicifolium, Carya ovata, Cornus foemina, Corylus americana, Frasera caroliniensis, Helianthus occidentalis, Phlox pilosa, Pteridium aquilinum, Quercus alba*, *Q. macrocarpa, Q. velutina, Solidago nemoralis, Sorghastrum nutans,* and *Frasera carolinensis. Angelica venenosa, Asclepias purpurascens, Liatris scariosa,* and *Silene stellata* are known

FIGURE 21. Early fall close-up view of the ground cover of the above white oak savanna along the former right-of-way of the MI Central RR. *Andropogon gerardii, Liatris scariosa, Solidago nemoralis,* and *Sorghastrum nutans* can be seen in the foreground.

FIGURE 22. Overgrown former white oak savanna (Cooper Tp.) with *Frasera caroliniensis* persisting along the roadside. Sixty years ago this site supported many other typical savanna plants (Hanes & Hanes 1947), but heavy shade has since developed here, and most of the former savanna plants have disappeared. Notice the many young *Acer saccharum* in the subcanopy and understory. Photographed in August.

only from former white oak savanna and perhaps adjacent prairie edges (Brewer 1984) in Kalamazoo County.

Many former sites of white oak savanna retain at least some of their original trees, but the savanna groundcover has been entirely eliminated. Sometimes a few relatively shade tolerant species such as *Arnoglossum atriplicifolium* and *Frasera caroliniensis* persist at oak hardwood forest edges (extant oak hardwood forests are often derived from overgrown oak savanna). A few oak hardwood forests persisting near the former prairies (especially Prairie Ronde) retain a portion of their presumed original savanna floras and may be at least partly recoverable with significant management. To my knowledge only one significant (but probably secondary) relatively intact remnant remains. It is located on the NE corner of the intersection of US 131 and Stadium Dr. in an old field corner adjacent to the former right-of-way of the MI Central RR.

Terrestrial Forest

Sugar Maple Forest (SUGAR-MAPLE-FOREST). Sugar maple forest is a widespread plant community in mostly mesic situations on silty or clayey soil. It once covered approximately 76,236.3 acres (P. Comer pers. comm. 1997). Usu-

ally a dense canopy is formed that is dominated by hardwoods such as Sugar Maple and American Beech. Young Sugar Maple may locally dominate the understory. Typically this is a very stable, terminal forest condition in the absence of fire. It is usually absent from level to rolling areas of former oak savanna and prairie except where wetlands or topography apparently served as fire breaks. On poorly drained sites, *Fagus grandifolia* is usually absent, and *Celtis occidentalis* can be relatively abundant.

The island woods, immediately W of the town of Schoolcraft, is a remnant of moderately drained sugar maple forest once isolated from surrounding forests by the former Prairie Ronde (see "Terrestrial Prairie"). It contains the only known population of *Aesculus glabra* and only known extant population of *Erythronium albidum* in Kalamazoo County (Brewer 1966b, 1980; Fleckenstein & Pippen 1977; Hanes 1944; Zager & Pippen 1977).

A variant of sugar maple forest with *Quercus muhlenbergii* scattered in the canopy, and a rather unusual understory flora occurs on moist levees (called islands by the Haneses) in a matrix of floodplain forest near the Kalamazoo River, mostly E of the city of Kalamazoo. *Hybanthus concolor* is known in Kalamazoo County only from this local variant of sugar maple forest.

Oak Hardwood Forest (OAK-HARDWOOD-FOREST). Oak hardwood forest is the most widespread and abundant forest type in Kalamazoo County today. It once covered approximately 78,209.1 acres (P. Comer pers. comm. 1997). The canopy in oak hardwood forest is usually less dense than in sugar maple forest. Oak hardwood forest shares many features with oak savanna, with which it is successionally related, and from which it is differentiated by having a greater density of trees (Comer et al. 1997; Comer et al. 1995). One to several species of oak and hickory, or oak and other hardwoods including young Sugar Maple usually dominate, depending on the history of the site, location, and substrate conditions.

Without fire, oak hardwood forest is generally not a stable climax and will slowly succeed to sugar maple forest (Brewer 1973; Cottam 1949; Curtis 1959; Robertson & Heikens 1994). Today's oak hardwood forests differ from their pre-European settlement namesakes in containing many fire-intolerant trees, shrubs, and saplings (such as Sugar Maple, Red Maple, and American Beech), and in exhibiting a closed or nearly closed forest canopy. Oak hardwood forest was once subjected to occasional fires, preventing, or at least reducing the establishment of the aforementioned fire-intolerant trees, and facilitating regeration and establishment of oaks, hickories, and other characteristic native trees and shrubs. The former prairie component of the understory of these forests has been largely lost, but vestiges of the hardiest species (especially at sites of overgrown former oak savanna) are still sometimes found at forest edges.

Oak hardwood forest is sometimes composed of even-aged stands of mostly *Quercus alba*, *Q. macrocarpa,* or *Q. velutina* resulting from fire suppression in former oak savanna, or more frequently, cutting followed by regeneration, or some other similar scenario. Large, perhaps original, oaks or hickories, sometimes called "wolf trees" occasionally persist in otherwise younger stands, espe-

FIGURE 23. Overgrown hillside prairie near McGinnis Lake (Climax Tp.) photographed in winter. This is a former site for *Besseya bullii*, and *Bouteloua curtipendula.* Notice how the openings between large trees have been overgrown with shrubs and small trees.

cially along roadsides, lakeshores, and at wetland edges (Curtis 1959). A very few remnants, mostly on steep hillsides, are dominated by even-aged stands of very large old trees, and may represent cut-over or perhaps even uncut and now overgrown former savanna. Some stands are composed almost entirely of oak, and approach what is sometimes called mixed oak forest.

Original, uncut oak hardwood forest is very rare (if it exists at all) in Kalamazoo County despite its former abundance. Disturbed remnants and young stands are frequent throughout the county. Important trees include *Quercus alba*, *Q. macrocarpa, Q. rubra, Q. velutina,* and *Carya ovata*.

Very dry, oak-dominated forests, such as in the Al Sabo Land Preserve in Texas Tp., are called dry forests by some authors.

Dry, relatively open hillsides, sometimes called hillside prairies, are floristically similar to oak hardwood forest but usually also have significant prairie and savanna components (Figure 23).

A small patch of mixed oak forest occurred on the W edge of Prairie Ronde Tp. at the time of the GLO surveys of 1826–1830. Relatively little is known about this former plant community since former remnants have been cut and/or have succeeded to oak hardwood forest. Some former black oak barren that has succeeded to forest, and some relatively isolated stands of oak resulting from succession in former white oak savanna, such as in the cities of Kalamazoo and

Portage, may superficially resemble mixed oak forests, but often lack a significant native understory.

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