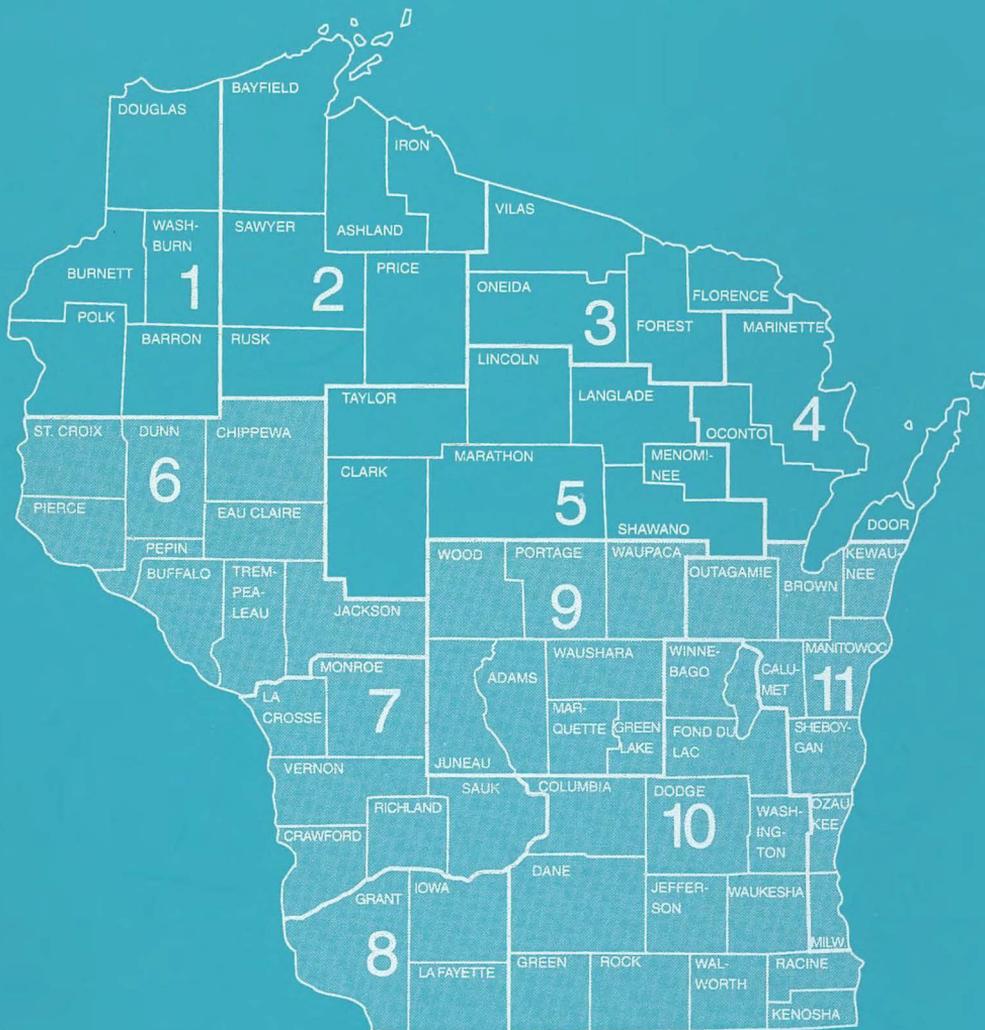




A Guide to
**Forest Communities
and Habitat Types**
of
Central and Southern Wisconsin



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and Habitat Types
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by
John Kotar
and
Timothy L. Burger

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J. Kotar
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Foreword

Forest habitat type classification, a system based on the study of floristic composition of vegetation, groups communities and their environments into categories useful for management interpretation. The system has been in use in Michigan and Wisconsin for over 15 years. In 1980, a field guide for Upper Peninsula of Michigan and northeastern Wisconsin (Coffman et al.) was published, followed by a Field Guide for Northern Wisconsin (Kotar et al. 1988).

Since 1988, more than 1000 copies of the Northern Wisconsin field guide have been purchased by individuals, public agencies and forest industries, and over 600 individuals have attended training workshops on the use of the system. Never intended as a rigid guide, or a conclusive treatment of ecological site relationships, the field guide has proven useful to resource managers and researchers to deal with the wide array of forest communities that always reflect natural disturbance and management history, as well as inherent site capabilities.

For example, the habitat type system provides the National Resource Conservation Service (NRCS) a means for interpreting soil surveys in terms of implications for forest resource manage-

ment. Using GIS computer technology they are producing habitat type distribution maps on various scales. Another example is the habitat type classification of permanent forest inventory plots by the USFS Forest Inventory and Analysis Program. The results will provide additional ecological information as well as improved interpretation of growth data, currently organized only by cover types.

Since 1989 over 1,100 stands were sampled in the southern two thirds of the state (48 counties) providing the basis for the present guide. There has been continuous evolution in scope and methods of presentation of information in the three publications. While, the Michigan field guide had strong emphasis on traditional forest management, the Northern Wisconsin field guide presented a broader interpretation. Although, still structured for use in field application, the current publication includes more comprehensive treatment of composition of present communities, regional differences, and history of vegetation development than do the preceding volumes. It is therefore intended not only as a "field guide" but rather as a more general reference to forest communities and site types of southern Wisconsin. It provides an

ecological framework for the development of interpretations and prescriptions for all management objectives that involve manipulation of vegetation.

Although habitat type classification field guides are intended primarily for professional users, they are also being purchased by the general public. In an effort not to discourage wider use, we made a few compromises in the present guide. Common names of plants have been included in most tables and are used exclusively in narrative parts. We have also added a short summary of principal ecological characteristics of selected tree species. However, we have not attempted to reduce the use of other technical terms. We still encourage serious users to attend training workshops.

Reminders and Cautionary Notes

The nature of forest vegetation of southern Wisconsin differs considerably from that in the north. In many areas, forests have been under continuous disturbance since, and often prior to, the Euro-American settlement. Disturbance included fires, grazing

and other uses, in addition to logging. For these reasons the application of the classification to specific sites will often be difficult, particularly the use of the identification keys. However, we have included as much floristic and descriptive information as possible to enable a user to interpret major management implications of most communities and sites.

Not every community and site type is included in this classification. The habitat types described for each region are based on stands or woodlots that had acceptable conditions for sampling. For example, recently grazed or otherwise disturbed, or low density stands were not sampled. In some areas the most productive soils are entirely in agriculture and no forest was available for sampling. Particularly lacking in our samples of some regions were communities on the poorest sites, such as steep slopes and ridges with shallow soils, because these tended to be the most disturbed. Likewise, small inclusions of rock outcrops or sands, on otherwise loamy landscapes were not sampled. Also excluded are most wet and swampy sites.

Introduction

In order to effectively manage forest resources, classification systems are needed. Traditionally, resource classifications have been developed only for specific uses. Forest cover types, for example, traditionally a standard unit for forest management, have serious limitations as ecological basis for developing management prescriptions. They are based entirely on current dominant, and most often successional, tree species. Thus, stands of a given cover type encompass a wide range of environmental conditions, and therefore have different productivity potentials, and respond differently to same management techniques. Similarly, systems that classify or map landscapes based entirely on physical factors (e.g. physiographic maps or soil surveys) are inadequate for management if they do not include ecological interpretations of communities (e.g. composition, growth, dynamics) that are associated with individual physical landscape units. For example, the hundreds of soil map units in Wisconsin clearly do not represent individual or distinct ecological, nor management units. In order to be useful for management interpretations they must be grouped into ecologically meaningful categories and must be accompanied by pertinent ecological interpretation.

If we desire to place management on an ecological foundation, a system that delineates and explains some basic ecological units is needed. The habitat type classification system uses natural vegetation (potential as well as current) to recognize ecologically equivalent vegetation communities and landscape units.

The habitat type system is a natural classification system for both, forest communities, and the sites on which they develop. It serves the following basic functions:

1. Communication — It provides managers and researchers with a common language for describing forest communities and sites.
2. Research — It provides a framework for systematic gathering and interpretation of research data and empirical knowledge.
3. Management interpretation— It allows resource managers to develop long-term management objectives and specific prescriptions for manipulating vegetation, based on knowledge of ecological potential of the land.

The Habitat Type Concept

The habitat type concept has its origins in the works of European ecologists in the early part of this century. They first discovered that, although no two plant communities are ever identical in terms of their floristic composition, plants are nevertheless found in recognizable assemblages. These assemblages later became known as "plant associations". While it became obvious that some assemblages reflect various disturbance regimes, it was also shown that other floristic patterns reflect differences in site itself.

In the United States Rexford Daubenmire demonstrated that climax communities on similar sites showed the strongest resemblance to each other. He named these communities "climax associations" and the site they represent he referred to as "habitat type" (Daubenmire 1966). In subsequent use the term habitat type has been applied to both, the plant association and the corresponding site type (Pfister and Arno 1989).

A "habitat type" includes all sites, or areas, capable of producing similar climax plant communities.

Because it is the long-term result of plant succession and community development, the climax plant community reflects the most meaningful integration of

those environmental factors that affect vegetation. Each recognizable habitat type represents a relatively narrow segment of environmental variation that is characterized by certain potential for vegetation development. Although, at any given time, a habitat type supports a variety of disturbance-induced, or seral plant communities, the ultimate product of succession, anywhere within the habitat type, is presumed to be a similar climax community.

Daubenmire originally characterized and named habitat types by species characteristic of climax communities. Habitat type name included the name of the tree species most capable of perpetuating itself in the absence of disturbance, and a name of a characteristic understory species of that site type (Daubenmire and Daubenmire 1968). Most tree species have a wide ecological amplitude (i.e. they occur over a wide range of environmental conditions) as members of successional communities, but have capacity to persist in the absence of disturbance, only within a portion of the gradient. For example, in Wisconsin white pine occurs on dry sandy soils as well as on rich moist soils. However, only on dry soils, where moisture and nutrient demanding species, such as sugar maple, do not occur, can white pine persist in mature communities. Such sites would be classified as "white pine habitat

types." On all other sites white pine would gradually be replaced by shade-tolerant species through a successional process. The range of sites where white pine successfully competes can further be subdivided into very dry and dry-mesic segments. These segments can be recognized by presence and absence of certain understory plants. For example, on dry-mesic sites we may find tick trefoil, but blueberries are absent or poorly represented, whereas on the drier sites blueberries tend to dominate and tick trefoil is absent. We could now distinguish between Pine/blueberry and Pine/tick trefoil habitat types. For this classification we have taken advantage of understory species whose ecological amplitude (range of environments) is not as wide as that of white pine.

Presence of mature or "climax communities" is not necessary for recognizing habitat types.

Although habitat types were originally defined in terms of floristic composition of presumed climax communities subsequent studies in various parts of the world, including Wisconsin, have shown that following a disturbance, the understory vegetation progresses more rapidly toward floristic mixtures resembling mature communities than does the succession in the tree layer. In other words, floristic composi-

tion, if not the relative dominance, of the understory becomes relatively stable soon after the canopy closes (Coffman and Willis 1977). Even before this stabilization occurs it is often possible to identify the diagnostic species among the temporary dominants. Most pioneering species are intolerant of shade and are easily identified. For stands of early successional stages, the habitat type can often be identified by comparison with adjacent, more mature stands, having similar topographic and soil features.

The habitat type system is a method of site classification that uses the floristic composition of plant community (understory species as well as trees) as an integrated indicator of those environmental factors that affect species reproduction, growth, competition, and therefore, community development.

Distinction Between Indicator Species, Ecological Species Groups and Differential or Diagnostic Species

It must be emphasized that habitat types are characterized by defined abstract plant associations (species combinations) and not by individual "indicator species". If this distinction is overlooked it can lead to misidentifica-

tion of the habitat type and possibly to mismanagement of the site.

No single species has been found, that by itself indicates a particular habitat type. Nevertheless, some species are useful as indicators of relatively narrow segments of environmental gradient or groups of similar habitat types. For example, a common occurrence of blueberries or wintergreen, indicates a site low in nutrients, while blue cohosh or bloodroot reflect sites relatively rich in nutrients. These species can therefore be used as indicators of relatively infertile or relatively fertile sites in general.

Within a given climatic region, species that behave similarly in respect to a particular environmental factor (e.g. moisture, or nutrient level) are often grouped into "ecological species groups" (Archaumbalt et al. 1989; Host and Pregitzer 1991). Presence of any member of the group can be used to draw conclusions regarding the relative status of a particular environmental factor. However, single indicator species or ecological species groups are generally not adequate for identification of specific habitat types. To do this, we must apply the concept of "differential" or "diagnostic" species.

Differential or diagnostic species have meaning only in the context of specific habitat types being compared. Thus, a differential species is one that occurs with

a high degree of constancy (i.e. was present in a large number of reference stands that made up a given type) or has high coverage on one habitat type, but is absent, occurs with low constancy, or has low coverage, on another (Mueller-Dumbois and Egler 1974). However, the same species may also occur on several other habitat types where it has no diagnostic value for distinguishing among them. Thus, in applying this classification one must never assume that the species that appear in the habitat type name automatically identify the type. One also cannot reliably identify habitat types by randomly searching for presumed "indicator" species. Instead, correspondence of a community in question with the appropriate abstract plant associations should be determined by carefully following the diagnostic procedure outlined in the opening chapters of section 3.

Habitat Type Relationships to Soils and Topography

Within a given climatic region, soils and topography are the primary factors responsible for site differences in terms of vegetation composition, growth and development. Throughout most of Wisconsin local topography is not very pronounced and soil differences are the main cause of variation in potential climax communities and thus habitat type differentiation. However, soil map

units delineated in soil surveys (conducted by Natural Resource Conservation Service, NRCS, formerly SCS), usually do not coincide exactly with a given habitat type, although strong relationships often exist (Kotar 1986). The reasons for the lack of direct correlations are found in the concepts of soil taxonomy and soil mapping methodology. Soil properties that affect habitat type differentiation are those that affect conditions of plant growth, such as moisture and nutrients. Soil taxonomy, however, is not based directly on such functional properties, but rather on morphological features that can more readily be measured and classified (e.g. type of horizon, color, structure and texture). These soil taxonomy parameters may or may not have a direct bearing on plant growth. Various combinations of soil properties that are used to delineate different soil map units often have the same net effect on vegetation and therefore numerous map units represent the same habitat type. This is why there are more than one hundred times as many soil map units delineated in Wisconsin than there are habitat types. However, in spite of their high number, soil map units often do not distinguish between ecologically important properties or combinations of properties. As a result, two or more distinct habitat types may be associated with the same soil map unit.

Because soil surveys were intended for a wide range of uses, map unit interpretations have to be made for each specific use. Traditionally, heavy emphasis has been on interpretation of suitability for growing various agricultural crops. This is relatively easily accomplished because direct measurements of annual yields of agricultural crops can be rapidly collected. However, interpretations in terms of tree growth and development of forest communities are much more difficult and have not been attempted. Nevertheless, the increasing desire by society to manage forests on a more ecological basis is generating a need to provide ecological interpretation of soil surveys.

In Wisconsin, the NRCS is accomplishing this by developing relationships between soil map units and habitat types. In ongoing soil surveys habitat type identifications are made in the field as soil map units are delineated. In this way relative frequencies of different habitat type occurrence on each soil map unit is being established. In counties where surveys have already been completed, sub-sampling of major soil map units is being conducted to develop probabilities of habitat type association. In general, we find that each soil map unit is associated with only one or two closely related habitat types. Because no more than five to ten

habitat types normally occur in a given county, where more than a hundred soil map units may be recognized, the soil survey interpretation for forest management is considerably simplified. Large numbers of soil map units are combined into a small number of groups according to habitat types they represent. The NRCS is rapidly computerizing this information and is making it available to users in various forms, including Geographic Information Systems (GIS).

In parts of SW Wisconsin, topography is sufficiently rugged to affect the expression of uniform soil properties. For example, a deep silt loam on level terrain would normally represent mesic site conditions. However, the same soil on a steep south-facing slope would likely result in dry-mesic conditions. In addition, the temperature differences would add to the contrast. In such situations habitat types cannot be directly related to soil mapping units, because slope aspect is not a criterion in soil map unit delineation. A new approach of landscape map unit delineation is needed to correct this problem.

Relationship of the Habitat Type System to Other Site Classifications in the Lake States

The habitat type system is best suited for interpreting the ecolog-

ical potential of various sites and the expected development of existing forest communities. However, habitat types often do not directly reflect potential operational limitations of the site, or the significance of a particular site in the context of larger landscapes. Direct field mapping of habitat types also tends to be time consuming and expensive. To delineate landscape units of similar overall capability and to facilitate habitat type mapping it is best to establish habitat type relationships with physical features that are easier to map, or have already been mapped. Physiographic landforms and soils are well suited for this purpose and are being used as a basis for site classification by the U.S. Forest Service. Although, specific approaches vary, depending on the availability of geological and soil surveys, all National Forests follow the same basic concepts. The system, known as "**The Ecological Classification System**" (ECS), is based on the nesting of smaller, more homogeneous land units within progressively larger, less homogeneous units (Cleland et al. 1993). The lowest unit of the hierarchy is an Ecological Land Type (ELT), or Ecological Land Type Phase (ELTP). These units are recognized as combinations of specific landform elements (e.g. topographic position, slope, aspect, etc.), specific soil, and presumably same kind of poten-

tial vegetation. If ELTs or ELTPs are homogeneous enough to support only one potential climax association (i.e. one habitat type) they can be considered to represent ecosystem units with similar biological potential and similar response to given management practices.

Although the ECS, to the ELT level, currently exists only on the National Forests, there are distinct advantages to having both systems available. The habitat type system provides information on community composition, growth potential of individual species and community dynamics, while the ECS provides spatial information, identifies physical limitations of a site, and aids in ecological interpretation of landscape patterns.

A map of the higher orders of the ECS (also known as the Hierarchy of Ecological Units) for the Lake States is included in section 4.

Relationship to forest community types of Curtis. The "Vegetation of Wisconsin" (Curtis 1959) remains the single most comprehensive treatment of the range of Wisconsin's plant communities. However, Curtis' classification of forest communities is rather general. He divided Wisconsin into two floristic regions: northern and southern. The southern region roughly corresponds to the area treated in this guide. For each of the two regions Curtis con-

structed an abstract moisture gradient (also called compositional gradient) based on relative importance of various tree species in sampled stands. As reference species, he used sugar maple for the mesic, and bur oak for the dry end of the gradient. He divided this gradient into five segments, labeled: wet, wet-mesic, mesic, dry-mesic and dry. A key, based on species composition of the tree layer is provided to assign a community to one of the five segments. Plant associations, or habitat types, delineated in this guide generally correspond to Curtis' moisture gradient segments, but because they are developed for smaller geographic areas, they more closely approximate composition of actual communities. There are, however, situations where the two approaches lead to different classifications. For example, an oak-pine dominated community is always assigned to the dry forest segment by Curtis' method (based on tree species composition only), whereas the habitat type approach, based on floristic composition of the understory, may find the community to be dry, dry-mesic, or mesic. The reason being, that current dominance by xeric tree species could either be the result of recent disturbance of a dry-mesic or mesic site, or it could be representing a relatively stable condition on a xeric site. In general, understory composition more accurately reflects site con-

ditions than do the trees. For further discussion of this topic see Kotar et al. 1988.

Regional Division

Although habitat types representing same segments of moisture-nutrient gradient in various parts of the State may not differ significantly in terms of basic management implications, sufficient regional floristic variation exists to warrant the delineation of region-specific floristic groupings (or abstract associations). This approach leads to the identification of a greater number of species with high constancy values for each habitat type than would be possible if only one generalized association were delineated for a large geographic region. Ultimately, this approach allows for the construction of more reliable floristic identification keys and more precise descriptions of habitat type characteristics.

The six regions included in this field guide were based on such factors as physiography, soils, climate and composition of plant communities. The exact boundaries between these regions cannot be precisely delineated because soils, climate and flora boundaries are always gradual and they probably never coincide. For convenience, counties were grouped into regions in such a way that each region could be characterized by at least one major natural feature. (See de-

scriptions of individual regions in section 3).

Plant Identification: Scientific versus Common Names

It should be noted that scientific names are universal and exclusive (i.e. the name assigned to a species is governed by strict international rules), whereas common names are neither. One species usually has several unrelated common names (e.g., blue-bead lily or yellow beadleily, for *Clintonia borealis*), or one common name can apply to several different species. For example, spiknard is used for *Aralia racemosa* (Sarsaparilla family) and *Smilacina racemosa* (Lily family). In addition, same common name is often applied to many species of the same genus that are ecologically very different from one another. For example, buttercup, wild geranium, and goldenrod each apply to dozens of species in the *Ranunculus*, *Geranium*, and *Solidago* genera, respectively.

Thus, to avoid confusion, the use of scientific names is encouraged. Scientific names need not be as intimidating as is often supposed. Pronunciation is not important as long as long as the name can be understood. Our experience also shows that individuals without any formal training in botany quickly learn to at least recognize scientific names

in print and can make good use of the field guide. In our *Field Guide to Forest Habitat Types of Northern Wisconsin* we used scientific names exclusively.

Nevertheless, we have found that the northern *Field Guide* is being used by nonprofessionals more widely than we had expected. Because we want to encourage wider use, we chose to use both scientific and common names, as much as possible, throughout this guide. However, for simplicity, we only use common names in the text portions of the guide. **When a question of accuracy arises while using common names, always consult the index to scientific names.**

Methods

Field procedures

The classification is based on systematic sampling of closed-canopy forest stands across a range of landforms and soils within a relatively small, climatically homogeneous regions. Although we attempted to include as many landform-soil combinations as possible the most extreme sites where productive forests apparently do not develop were excluded (e.g. narrow ridges or steep south-facing slopes with thin soils). Sample stands were free of large canopy gaps, skid roads or other recent disturbances. In each stand a 21 m x 14 m (approximately 300 square

meters) macro plot was laid out. The plot was further subdivided into six 7 m x 7 m subplots. Within each of the subplots all plant species, with the exception of grasses, sedges and mosses, were identified and their abundance estimated according to six coverage classes: 1, <1%; 2, 1-5%; 3, 5-25%; 4, 25-50%; 5, 50-75%; 6, >75%. Plants were divided into the following categories: trees (large trees, poles, saplings, seedlings), shrubs and herbs. Species coverage values for the six subplots were later averaged to obtain one value for the macroplot. Basic soil characteristics (depth, texture) and other site characteristics (slope position, aspect) were also recorded.

Delineation of ecological floristic groups or abstract associations. Vegetation analysis forms the basis for the classification. The first step in this process is to produce an ordered association table. Such a table consists of rows and columns, where rows are species and columns are sample plots. The columns and rows are sorted in such a way that sample plots which share most species in common are grouped together. A computer program TWINSPAN (Hill, 1979) was used to produce the first approximation. The grouping of plots by this program does not necessarily represent ecological groupings or associations. Inter-

pretation of these computer-generated groups and final delineation of associations involves comparisons with data bases from other regions and information on habitat preferences of various species accumulated through previous studies.

Relationship of floristic associations to environment. The ecological relationships among delineated floristic groups were examined through the Synecological Coordinates ordination (Bakuzis 1959, Bakuzis and Kurmis 1978). On the basis of extensive studies in Minnesota, Bakuzis assigned each forest species (trees, shrubs and ground flora) a value of 1-5 to indicate the species' requirements (for optimal growth and survival) under competitive conditions) for each of four site factors: moisture, nutrients, light and heat. He termed these values "synecological coordinates." For example, a species with a moisture index of 5 occurs primarily in very wet environments, while another, with an index of 1, occurs primarily on droughty sites. Using Bakuzis' list of synecological coordinates values, an estimate of environmental conditions of a give site is obtained by calculating a mean index from the individual indices of all species present on that site. Although this system was intended primarily for use in Minnesota, data from several Wisconsin studies were also included

in its development and we found that, with caution, it can also be used in Wisconsin.

We used the moisture and nutrient indices to calculate and plot the means for all sample plots in our data sets. The plots representing floristic groups delineated in a given region formed clusters with varying degree of overlap among the most similar groups. The rectangles in the graphs presented in section 3 were drawn so that they include at least 90% of the plots representing each floristic group (habitat type). Descriptive terms (e.g., dry, dry-mesic, mesic and poor, medium, rich) were arbitrarily assigned to segments of moisture and nutrient axes to provide more visual interpretation of the physical environment of various habitat types.

Naming the Habitat Types

Because plant associations described above reflect particular site conditions (i.e. segments of environmental gradient) they are considered as habitat type indicators. Thus, the association's name refers to both the diagnostic plant assemblage and the site type (habitat type).

Habitat type names, although somewhat arbitrary, are based on ecological criteria. Each type is named in part after a tree species that shows strongest tendency to dominate a community on that site type in the absence of distur-

bance. This is usually the most shade tolerant species that the site type is capable of supporting. For example, sugar maple is one of the most shade tolerant trees in Wisconsin, but its ecological amplitude is restricted to mesic and dry-mesic nutrient rich sites. On drier and less fertile sites it grows poorly or not at all and potential dominance is assumed by other, less shade tolerant species such as white pine or red maple. Throughout Wisconsin sugar maple (*Acer saccharum*) is the potential dominant climax species on all mesic and some dry mesic site types. In some regions, basswood (*Tilia americana*) is a common associate of sugar maple, thus the mesic and dry mesic habitat types contain both names e.g. **Acer-Tilia/Desmodium**. For convenience the name is abbreviated **ATiDe**. The second part of the name, in this case **De** for **Desmodium glutinosum** (pointed-leaf tick trefoil), is one of the characteristic understory species of a dry-mesic sugar maple association. It is used to distinguish this association (or habitat type) from other mesic sugar maple-basswood types e.g. **ATiSa** (*Acer-Tilia/Sanguinaria*) and **ATiCa** (*Acer-Tilia/ Caulophyllum*).

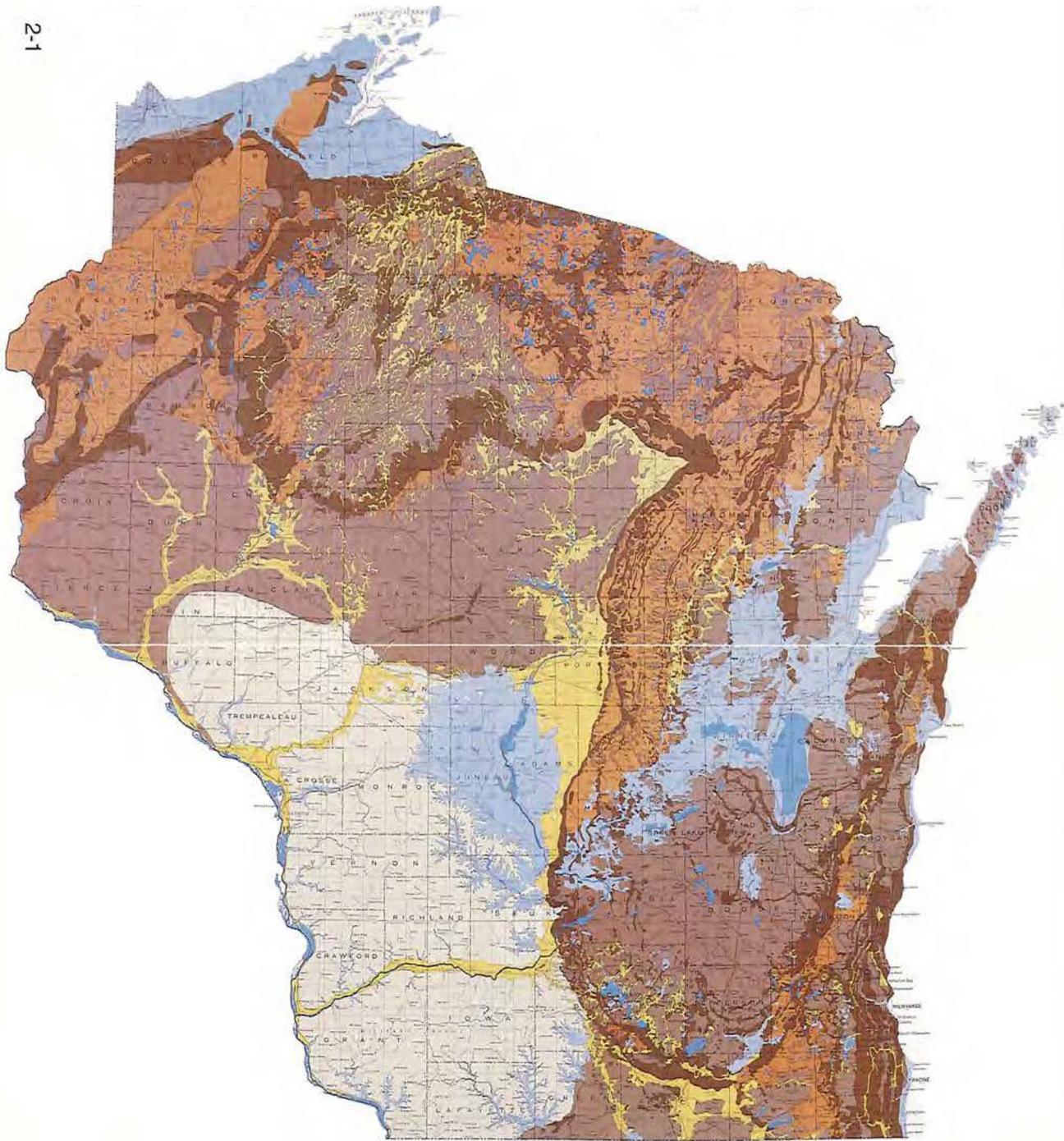
Two other naming concepts must be explained: a habitat type **variant** and a habitat type **phase**. A variant is designated when similar, but not identical associations

are delineated in two or more geographic regions. For example, **ArCi-Ph** (*Acer rubrum/Circaea - Phryma* variant) in region 7 is in most respects similar to a type **ArCi**, previously delineated in region 6. Never the less the region 7 type contains a number of species of typically southern centers of distribution. This implies some climatic difference between the two regions. In order to facilitate future research, the region 7 type was not lumped together with previously delineated **ArCi** type, but was given a label of geographic variant **ArCi-Ph**.

A habitat type **phase** relates to historic differences in disturbance regimes between two presumably identical site types. For example, plotting the locations of the reference stands of the **ATiDe** type on the map of presettlement vegetation showed that these areas were dominated by sugar maple-basswood forests. Almost all of these reference stands still have strong presence of maple and basswood today. However, the plotting of reference stands for the **ATiDe(Pr)** type in the same way showed that they represent areas formerly occupied by oak savanna or oak openings. There are no apparent differences in soil between these types and although sugar maple and basswood are rare today, wherever they do occur they grow well and are reproducing. Thus, the type was designated as **Acer-Tilia**

(ATi) even though today's stands are dominated mostly by oaks and hickory. It is clear that communities on the **ATiDe(Pr)** habitat type represent a vegetation phase

with significantly different historic development, and different management implications, than do the stands of the **ATiDe** type .



Outwash

Outwash plains, terraces, fans, and valley trains. Mainly well-sorted and stratified sand and/or sand and gravel.



Pitted Outwash and Other Ice Contact Deposits

Pitted outwash plains, kames, eskers, crevasse fillings, and related features. Mainly sand and gravel with sorting and stratification locally poor.



Ground Moraine

Till plains, thin drift, mostly till of relatively uniform thickness but discontinuous in some areas of older drift. Includes drumlins.



End Moraines

Terminal, recessional and interlobate moraines, mostly till and associated local ice contact deposits.



Glaciolacustrine Deposits

Lake sediments, including associated deltas, sand dunes, and organic deposits. Mainly sand, silt and clay.



No Glacial Deposits

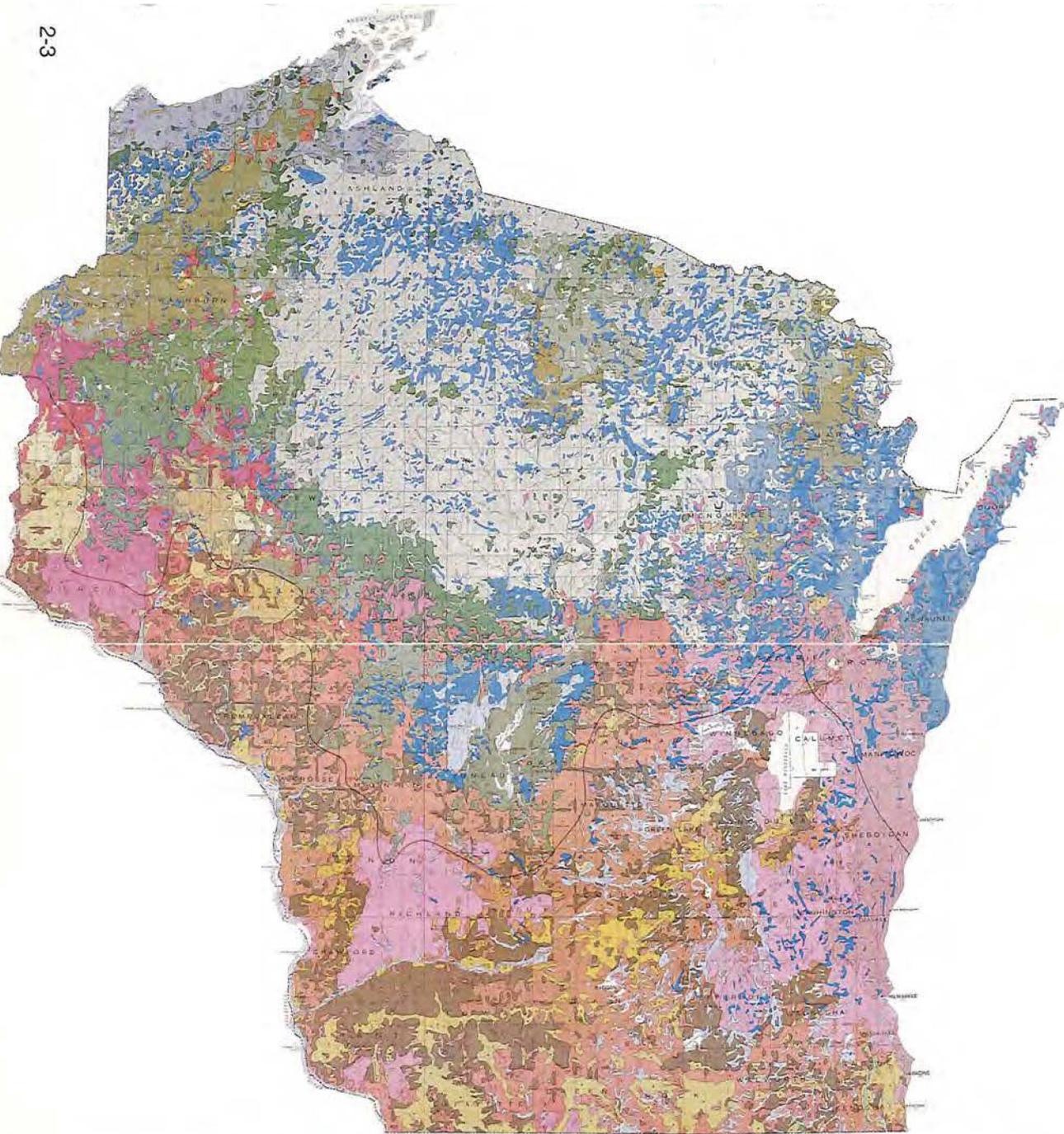


Water

Map 2.1 Glacial Deposits of Wisconsin

This map shows the distribution of the basic types of glacial and fluvio-glacial (water-transported) deposits, or landforms, which are strongly related to major soil categories. Because considerable variation in soil texture, depth, and other characteristics exists within each of the deposit types depicted, the map should not be viewed as a substitute for a soil map. However, on a local level, various habitat types often correlate strongly with the distribution of these deposits.

(Map published by the Wisconsin Geological and Natural History Survey.)



- | | | | | |
|---|--|---|--|---|
| <p>Boreal forest</p> <ul style="list-style-type: none"> White spruce, Balsam fir, Tamarack, White cedar, White birch, Aspen | <p>Mixed coniferous-deciduous forest</p> <ul style="list-style-type: none"> Beech, Hemlock, Sugar maple, Yellow birch, White pine, Red pine Hemlock, Sugar maple, Yellow Birch, White pine, Red pine Sugar maple, Yellow birch, White pine, Red pine | <p>Deciduous forest
(Often intermingles with White Pine and Red Pine above the southern pine limit)</p> <ul style="list-style-type: none"> White pine, Red pine Jack pine, Scrub (Hill's) Oak forest and barrens Aspen, White birch, Pine | <p>Grassland and Brush</p> <ul style="list-style-type: none"> Prairie Brush | <p>Wetland vegetation</p> <ul style="list-style-type: none"> Swamp conifers—White cedar, Black spruce, Tamarack, Hemlock Lowland hardwoods—Willow, Soft maple, Box elder, Ash, Elm, Cottonwood, River birch Marsh and sedge meadow, Wet prairie, Lowland shrubs |
|---|--|---|--|---|

Southern limit of pine as a common ingredient of the forest

Map compiled by Robert W. Finley and published by the North Central Forest Experiment Station; U.S. Forest Service

Map 2.2 Original Vegetation Cover of Wisconsin.

This map depicts the distribution of the major forest types, as reconstructed from the records of land surveys, conducted prior or at the time of major settlement. It must not be construed that these forest types represent climax forests. They simply show the dominant species components of forests that existed at that time. The species composition was undoubtedly far more complex than is shown here. The primary value of the map is that it helps us infer the major soil-climatic zones from the distribution ranges of major tree species. Of particular interest are the distributions of hemlock, yellow birch, beech and oaks.

Key to Map 2.3. Natural Divisions of Wisconsin

Division 1. Lake Superior

Lowland: Boreal Forest

Soils formed from till and lacustrine deposits, calcareous red clays, pink sands, peats, and mucks. Undulating and rolling plains with balsam fir, white spruce, white pine, white cedar, aspen, and paper birch; some sugar maple, yellow birch, and hemlock; black spruce-tamarack in organic soil wetlands.

Division 2. Northern Highland: Deciduous and Coniferous Forest

2a Pine-oak forests and barrens; podzolized outwash sands; nearly level to rolling landscape with lakes and bogs; small inclusions of clayey soils in Burnett and Florence Counties. White and red pine forests developed in absence of fire. Black spruce and tamarack on wet organic soil.

2b Sugar maple-hemlock-yellow birch-white pine forest; podzolized stony loams over acid outwash and till; undulating to rolling landscape. Moraines, drumlins, ice-contact features, and outwash plains with lakes and bogs. Mostly northern mesic forest, some spruce-fir on wet mineral soils and spruce-tamarack bogs on wet organic soils.

2c Sugar maple-basswood-yellow birch-hemlock forest, podzolized, slowly permeable silt loams; nearly level to undulating landscape. Wind-blown silt cover, up to 30 inches thick. Organic soil wetland; vegetation similar to that of wetlands in 2b.

2d Sugar maple-basswood-yellow birch forest, with hemlock and white pine; podzolized silt loams over out-

wash sands; undulating topography. Soils more droughty than in 2c; strongly podzolized. Black spruce and tamarack bogs on wet organic soils.

2e Maple-oak-white pine forests; well to poorly drained podzolized loamy sands over acid, infertile shaly sandstone; undulating to rolling terrain with extensive wetlands. Presettlement forest; red and white oak, maples, and white pine on uplands and lowland deciduous, including red maple and American elm, in wetlands.

2f Sugar maple-hemlock-yellow birch forest; podzolized silt loams and loams over decomposed igneous and metamorphic rocks; undulating to rolling topography with many long slopes. Spruce-fir, tamarack, and black ash on large organic soil wetland.

Division 3. Lake Michigan Shoreland: Northern Deciduous (with American Beech) and Coniferous Forest

3a Beech-sugar maple-hemlock forest; podzolized loams over pink, calcareous till; undulating to rolling topography.

3b Beech-sugar maple-hemlock forest; podzolized silt loams on thin, pink calcareous till over dolomite bedrock; undulating to rolling landscape. White cedar and spruce-fir forest on thin neutral or alkaline soils on outer Door Peninsula.

3c Beech-sugar maple forest; red clay on calcareous till; level to rolling topography. Yellow birch and elms with some hemlock and white pine along the Lake Michigan shore.

**Division 4. Central Plains:
Oak-Pine Barrens, Oak Forest,
Oak Savanna, and Wetlands**

4a Pine and oak barrens; nearly level sand plains with sandstone buttes. Droughty infertile sands in the west part and more fertile outwash and dune sands in the central part; fire-maintained jack pine, Hill's oak, and black oak.

4b Oak savanna, oak forest, and prairie; sandy loams on nearly level outwash plains and rolling till surfaces with kettle lakes. Black oak and Hill's oak with associated prairie vegetation. Includes many wetland types.

**Division 5. Southeastern Ridges
and Lowlands: Deciduous
Forest, Savanna, and Prairie**

5a Sugar maple-basswood-elm forest; clay soils formed in red calcareous till; undulating land surface. Mineral soil wetlands and organic soil wetlands are included.

5b Mixed sugar maple-basswood-red oak-white oak forest; silt loams and loams over brown calcareous loam till; undulating to rolling topography. In locations protected from fire, leeward of rivers and lakes, sugar maple and basswood dominate. Oak-hickory and maple-basswood forest on undulating to steep Kettle Moraine and adjoining hilly, stony lands.

5c Oak savanna and prairie; silt loams over calcareous till and stratified calcareous outwash; undulating to rolling topography. Oak savanna and oak forest of white, bur, black, and red oak.

5d Sugar maple-basswood-red oak-white oak forest, oak savanna and prairie; silt loams over pre-Wisconsin leached till on uplands and over Wisconsin calcareous outwash on

plains; undulating to rolling surface. Mesic forest, bur, and white oak savanna with prairie on uplands, prairie on outwash plains.

**Division 6. Southwestern
Upland: Deciduous Forest,
Oak Savanna, and Prairie**

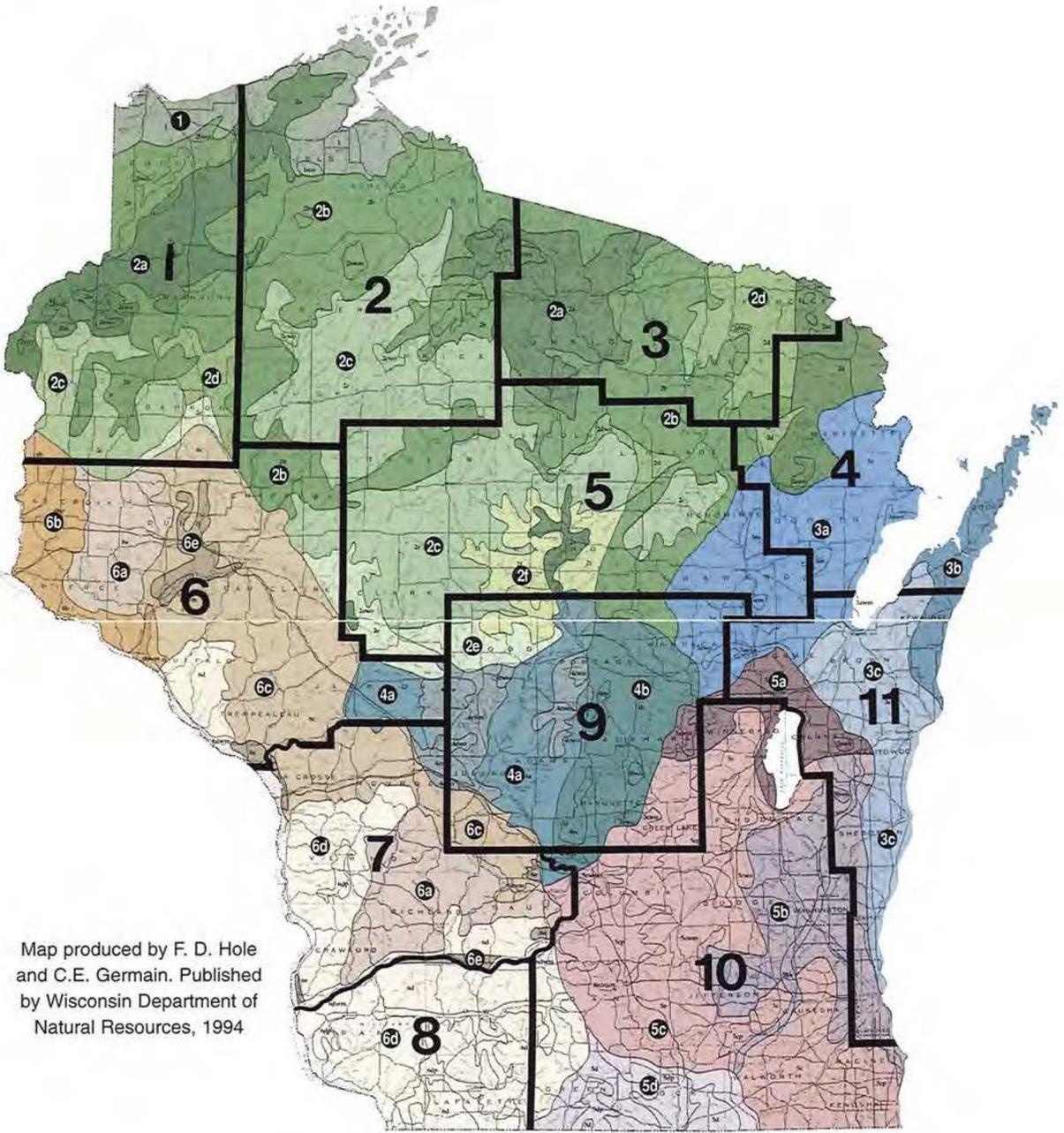
6a Sugar maple-basswood-oak forest; silt loams over acid till (north) and over cherty red clay, dolomite, and sandstone (south); undulating to hilly landscape. Mesic forests in both north and south parts with natural fire barriers, e.g., Kickapoo River. Some white pine in northern part.

6b Bur, white and Hill's oak forest, oak savanna, and prairie; silt loams and sandy loams over acid to calcareous till; dolomite and sandstone; rolling to hilly topography. Floodplain forest; silver maple, swamp white oak, and willows along major rivers.

6c Oak savanna; silt loams and sandy loams over sandstone; rolling to hilly. Bur, white, and Hill's oak savanna with oak forest in absence of fire; some white and red pine on favorable exposures. Prairie and sedge meadow on wet mineral soils.

6d Oak savanna and prairie; silt loams over cherty, clay residuum on dolomite ridges; silt loams over sandstone on some valley walls; rolling to hilly land surface. Occurs in four major areas, with bur, white and black oak, and interspersed prairie. Extensive prairie on ridge tops and outwash terraces; floodplain forests on wet mineral soils.

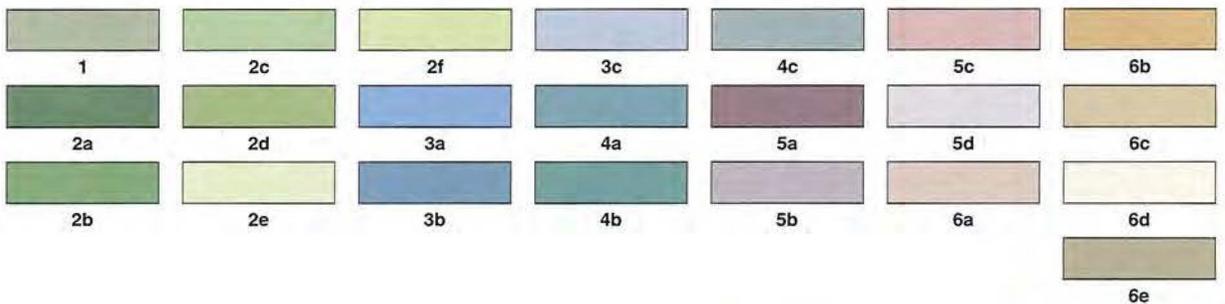
6e Terrace prairie; sandy and loams soils over outwash sand; nearly level topography. Occurs in seven areas in the Wisconsin, Mississippi, and Chippewa River valleys; prairie grasses and forbs. Prairie on wet mineral soils.



Map produced by F. D. Hole and C.E. Germain. Published by Wisconsin Department of Natural Resources, 1994

Map 2.3 Natural Divisions of Wisconsin.

This map is based on published state maps of bedrock geology, glacial deposits, landforms, aeolian silt and sand deposits, vegetation and soils. The titles of the six primary divisions reflect the bases used in delineation: presettlement vegetation, landform and soil. Because of the small scale of the map reproduced here only first order subdivisions are shown. The accompanying legend was modified and abbreviated accordingly. The original map, at a scale of 1: 1 million, includes some second order subdivisions, and a much more comprehensive legend. We found considerable correspondence between natural subdivisions and distribution of specific habitat types. The relationships are noted in habitat type descriptions. The user must keep in mind, however, that the Natural Divisions Map describes only presettlement vegetation, while habitat types also include current conditions.





Map 2.4 Wisconsin portion of the Ecological Units of the Eastern United States. USDA Forest Service, 1995.

See pages 1-8 and 1-9 for explanation.

212H Northern Great Lakes Section

Subsections:

- 212Ha Gwinn-Deerton outwash and sand ridges
- 212Hb Northern Lake Michigan Till Plain
- 212Hc Green Bay clayey and silty lake plain
- 212Hd Green Bay till plain
- 212He Door-Escanaba Peninsulas and Lake Plain
- 212Hh Seney sand lake plain
- 212Hj St. Ignace lake plain
- 212Hk Rudyard clay lake plain
- 212Hi Cheyboygan lake plain
- 212Hm Harrisville moraines
- 212Hn Stutsmanville sand ridges
- 212Ho Travers City drumlin fields
- 212Hp Vanderbilt moraines
- 212Hq Mio Outwash and Lake Ridges
- 212Hr Tawas lake plain
- 212Hs Cadillac end moraines
- 212Ht Big Rapids loamy moraines
- 212Hu Newaygo outwash and ice contact
- 212Hv Wellston outwash and ice contact
- 212Hw Manistee outwash and lake sands

- 212Hx Hart outwash and lake sands
- 212Hy Kalkaska Moraines

212J Southern Superior Uplands Section

Subsections:

- 212Ja Lake Superior Clay plaign
- 212Jb Gogebi-Penokee Iron range
- 212Jc Winegar moraines
- 212Jd St. Croix Moraine
- 212Je Central NW Wisconsin loess plain
- 212Jf Perkinstown end moraine
- 212Jg Lincoln formation till plain, mixed hardwoods
- 212Jh Neillsville snadstone plateau
- 212Ji Rib Mountain rolling ridges
- 212Jj Green Bay Lobe stagnation moraine
- 212Jk Spread Eagle-Dunbar barrens
- 212Jl Brule and Paint Rivers drumlinized ground moraine
- 212Jm Northern Highlands pitted outwash
- 212Jn Baraga coarse rocky till
- 212Jo Ewen Dissected Lake plaign

- 212Jp Keweenaw Peninsula
- 212Jq Isle Royale
- 212Jr Michigamme haghland
- 212Js Lincoln formation till plain, Hemlock-hardwoods

212K Western Superior Section

Subsections:

- 212Ka Bayfield sand plains
- 212Kb Mille Lacs uplands

212L Northern Superior Uplands Section

Subsections:

- 212La Border Lakes
- 212Lb North Shore highlands
- 212Lc Laurentian Highlands
- 212Ld Toimi Uplands

212M Northern Minnesota and Ontario Section

Subsections:

- 212Ma Littlefork-Vermillion Uplands

continued on back...

212Mb Agassiz Lowlands
212N Northern Minnesota Drift and Lake Plains Section

Subsections:

212Na Chippewa Plains
212Nb St. Louis Moraines
212Nc Pine Moraines and outwash plains
212Nd Tamarack Lowlands

220 Hot Continental Division

222 Eastern Broadleaf Forest (Continental) Province

222I Erie and Ontario Lake Plain Section

Subsections:

222Ia Maumee lake plain

222J Southern Great Lakes Section

Subsections:

222Ja Allegan Lake Plain and Moraines

222Jb Lansing till plain
222Jc Lansing medium-textured ground moraine
222Jd Huron-Saginaw lake plain
222Je Jackson Interlobate moraine
222Jf Washtenaw moraines

222K Southwestern Great Lakes Morainial Section

Subsections:

222Ka Western Central Wisconsin Sand Plain
222Kb Central Wisconsin Sand lake plain
222Kc Central Wisconsin moraines and outwash
222Kd Lake Winnebago Clay plain
222Ke SE Wisconsin rolling till plain and Kettle Moraine
222Kf South Central Wisconsin prairie-savannah
222Kg Kidder-McHenry drumlin
222Kh Johnstown moraines and plains

222Ki SW Lake Michigan Lake Border Moraines and plains

222Kj Darien Moraines and till plains
222Kk Rock River old drift country

222L North Central US Driftless and Escarpment Section

Subsections:

222La Reeve-Baldwin-Dallas eroded Pre-Wisconsin till
222Lb Sandstone bedrock Oak forest and savannah
222Lc Steeply dissected limestone, dolomite, sandstone
222Ld Kickapoo, steeply dissected sandstone
222Le Limestone-Dolomite prairie-savannah
222Lf Western Paleozoic plateau

Habitat Type Descriptions by Region

Explanation of Elements Included in this Section

Floristic Identification Keys

We must emphasize that the key is not the classification, but only a tool to aid in habitat type identification. It is intended as a starting point for a user who is not yet familiar with characteristics of habitat types in a given region. Almost a decade of experience with the use of this system in northern Wisconsin shows that serious users soon become familiar with the characteristics of habitat types in their regions and do not require the use of keys on continuous basis.

The keys are constructed in a flow chart format so that habitat types at the bottom of the chart are arranged on a relative moisture-nutrient gradient from dry, low-nutrient, on the left, to moist, nutrient-rich, on the right.

Follow the instructions below:

1. Locate yourself on the map and select the key for the appropriate region. **Note:** Because habitat type region boundaries were for convenience set to follow county lines, they should not be treated as absolute, or natural. Therefore, if you are located near any of these boundaries also consult keys of the adjacent region.
2. Determine that you are in an area of a stand that is representative of the habitat as a whole. This is sometimes difficult if the terrain is irregular (e.g. mounds and depressions, or ridges, plateaus and

slopes). In such cases it is likely that several habitat types are present and one must decide whether all or only the most extensive ones will be considered.

3. Outline an area of approximately 300 m² (56 ft x 56 ft) and look for species listed in the top two boxes in the key, joined by a horizontal line. Compare the statements in the two boxes, make your choice, and proceed down the flow chart to the next pair of boxes.

In this process exclude extreme micro sites such as rotten logs, stumps, small wet areas and rock outcrops. In some instances the coverage estimate is added to the species presence. Coverage is the area covered by the gross outline (vertical projections) of an individual plant's foliage, or collectively covered by all individuals of a species within a designated reference area. It is expressed as a percentage of total reference area or as a coverage class. Two coverage classes are most often used in the key: 1%, designated in the key by (c) for common, and >5% (w) for well represented. It is important to remember that if the designated coverage value is not met, the species is considered as rare or poorly represented in the interpretation of the key.

4. For estimating coverage it is helpful to outline somewhere within the area being examined, the 1% and 5% reference areas. For a 300 m² observation plot the respective

- dimensions are 3m² (1.7 m x 1.7 m) or 31 ft² (5.6 ft x 5.6 ft); and 15 m² (3.9 m x 3.9 m) or 157 ft² (12.5 ft x 12.5 ft).
5. The statement in the key "at least 2 present" does not imply that a large number of species listed in the box should be expected. This is particularly true in the upper levels of the chart where species lists must include representative species of several different habitat types.
- The statement in the key "**group below better represented than group on the left/right**" refers to the number of species of the groups that are present and **not** the total collective coverage.
6. It must also be remembered that the keys are based on relative frequency of occurrence of species on various habitat types. This means that stands may not contain some of the species listed in the keys. In such cases consult paired comparison tables explained below and other descriptions found in this section.
7. Sometimes the identification cannot be made from observation of a representative plot because the understory vegetation is fragmented for various, but not always obvious reasons. In such cases it is necessary to walk around a larger area of the stand to come up with cumulative assessment of species presence and relative abundance. Experienced users almost always follow this method.
8. If a stand has been disturbed continuously over a long period of time, or is a plantation, the habitat type can best be determined from observations in the nearest undisturbed stand occupying a similar site in terms of topography and soil.
9. **Borderline cases.** It must be remembered that each plant association described in this field guide represents a central concept of floristic composition for a range of sites known collectively as a habitat type. No specific criteria have been defined to recognize exact boundaries between related habitat types. Many stands will indeed occupy an intermediate positions. In such cases, depending on management objectives, a stand can be assigned to the habitat type it resembles most closely (considering all information provided in this field guide), or it can be labeled as an intermediate, e.g., PVRh/PVHa.

Tables of Comparison of Major Floristic Differences Between Closely Related Habitat Types

Sometimes an insufficient number of diagnostic species are present for the identification keys to work properly, or there is uncertainty about the outcome of the keying out process. In such cases one can examine the species that are present on the site and compare their expected frequencies of occurrence (constancy) between the keyed out type and other similar types.

Each regional section includes several tables of paired comparisons.

The tables list those species whose constancy percentages differ significantly between the types being compared. If the average coverage values are also significantly different, they are shown as a second value, separated from the constancy value by a comma.

The species encountered should show the predominance of the higher constancy values on one of the two types being compared. The horizontal dividing line in the table separates the characteristic species groups of the two types.

Using this approach, together with other habitat type characteristics described in this field guide, it should be possible to allocate a site to the appropriate habitat type.

Relationship of Habitat Types to Soil Moisture Nutrient Regimes

Habitat types of each region are shown on the moisture-nutrient synecological coordinates grid. For explanation see **Relationship of Floristic Associations to Environment** in the introduction section.

Description of Habitat Types

For each habitat type the following information is included:

Distribution. Brief description of our present knowledge of the geographic distribution of each type. Based on the distribution of our study sites, soil maps and, in some cases, maps of presettlement vegetation. Special reference is made to the map of Natural Divisions of Wisconsin, by Hole and Germain 1994. (See map section).

Similar types. Types in the same region, and sometimes adjacent regions, that are most easily confused with described type. The use of floristic comparison tables is advised.

Landform and soils. Predominant landforms and soil families associated with the described habitat type. This information is based on data from our study sites and on soil and Natural Division maps.

Major forest cover types. Because of a wide range of disturbance regimes many species combinations can be found on all habitat types. A listing or ranking of the abundance of specific cover types is not possible based on our data, because our sample stands were not randomly or systematically allocated within regions. Such information will become available once the habitat type classification of all continuous forest inventory (CFI) plots, used in the USFS Forest Inventory and Analysis Program, is completed. The project is currently in progress. The information given in this section is based on the analysis of reference stands representing each habitat type. This number ranged from 12 to 65 stands.

Shrub and small tree layer. This section describes the best represented (not necessarily diagnostic) species in our reference stands. The label "small trees" is applied to species that do not reach normal tree size in Wisconsin, or on a given habitat type. It does **not** apply to saplings of typical tree species. Examples are choke cherry, American hornbeam (*Carpinus*) and black cherry on the droughty sites.

Ground flora characteristics. This section describes both the typical dominant species and some diagnostic species useful for distinguishing among similar habitat types.

Disturbance and succession. In this section we attempt to explain the origins of current forest mixtures and apparent successional trends in the absence of disturbance.

Constancy tables. Each habitat type description is accompanied by a constancy table. Constancy, or frequency of occurrence, is the percentage of reference stands (out of a total number of reference stands sampled for a given habitat type) in which a species occurred. It is therefore an indication of expected occurrence of a species in a particular stand on a given habitat type. Tables include all species with constancy greater than 20 percent. They are helpful for characterizing habitat types, but can also be useful to resource managers who are interested in identifying habitat types with preferential occurrence of particular species.

Tables of the Occurrence of Tree Species on Various Habitat Types

These tables provide a quick overview of tree species across the environmental gradient represented by all habitat types within a region. The important feature here is a sepa-

rate listing of four size classes (seedlings, saplings, medium and large-diameter trees). These tables can be used in conjunction with successional diagrams (section 4) to help assess the dynamics of forest cover types on various habitat types. They are particularly useful for identifying those habitat types where natural regeneration of a given species can be expected.

Tables of Understory Species with Potential Diagnostic Value for Distinguishing Habitat Types of a Region

As explained in the introduction, no species have been found that occur exclusively on a single habitat type. However, if habitat types of a given region (instead of a whole state) are compared, we find that a few species do occur on only one, or perhaps two habitat types. More importantly, a fair number of species show discontinuities in presence, or display gradients in constancy, if habitat types are arranged along a moisture-nutrient gradient. A table shown such a listing is included in each region.

This table can be used to further verify habitat type identifications. In addition, this table is useful for identifying habitat types where species of particular interest is likely to be found. Also useful for this purpose is the alphabetized listing of species for all habitat types found in table 6.3 in the appendix.

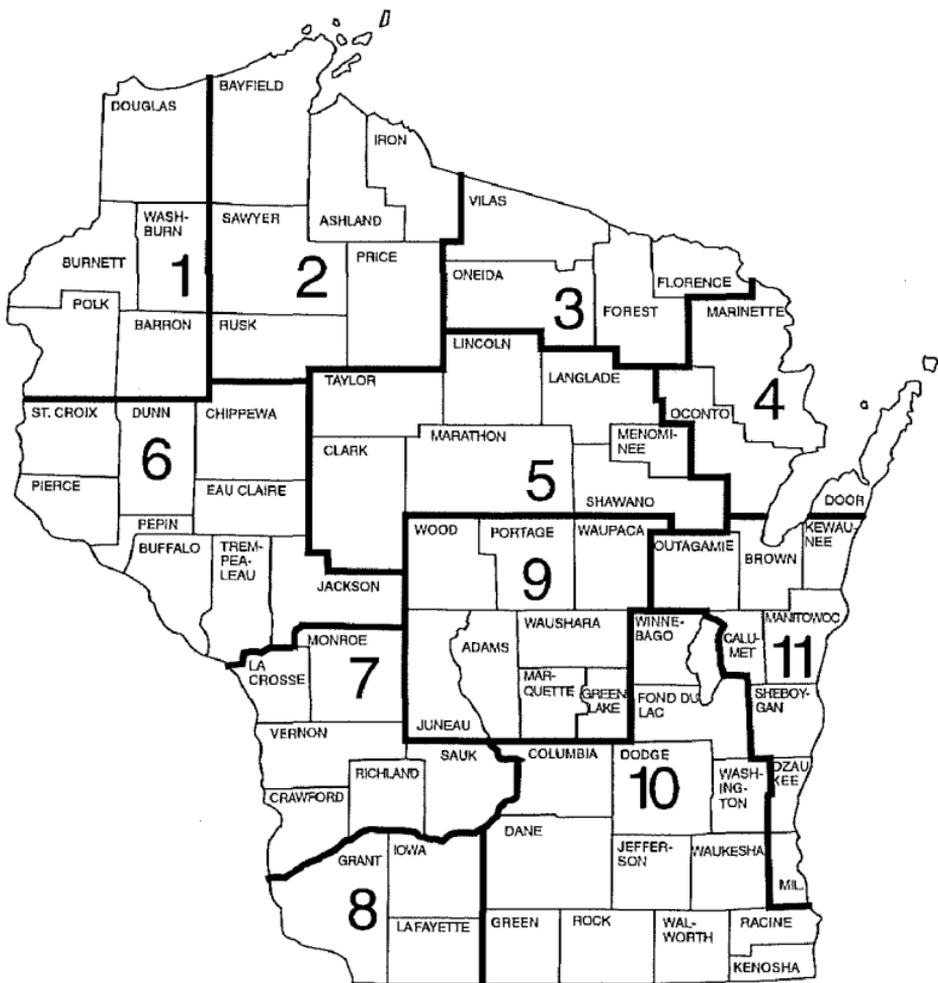


Figure 3.1. Division of the state into 11 regions for purposes of habitat type classification. Regions 6 through 11 are included in this guide.

Region 6

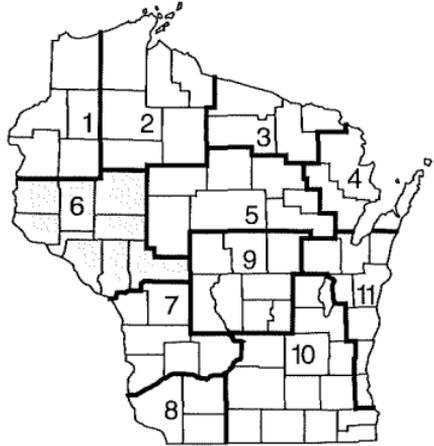
Extent, topography, geology and soils

This region represents the northern part of the Natural Division 6 and includes the following counties: St. Croix, Pierce, Dunn, Chippewa, Eau Claire, Pepin, Buffalo Trempealeau and Jackson. The region has hilly topography resulting from stream dissection of sandstone bedrock. Much of it lies within the Driftless Area, but a thin layer of pre-Wisconsin glacial till covers some of the northern and northeastern portions. In many areas loess deposits provide a silt loam surface layer. Sandstone outcrops are common, as are low cliffs along stream courses. Natural subdivision 6c, characterized by weakly cemented sandstone, with a covering of a mixture of loess and sandstone residuum, represents more than half of the region's area. Dominant soils are Gale silt loam, formed in about two feet of loess over sandstone, and Norden loam, formed in loess mixed with greensand material. Hixton loam occurs where greenstone is absent. The infertile Boone sand, formed over nearly pure quartz, is also common.

The northern glaciated portion is characterized by two to three feet of loess over till that is either calcareous or leached. The till itself lies over dolomite bedrock. Santiago and Renova silt loam are the most common soils.

Forest vegetation

Presettlement vegetation included oak savanna, oak openings, southern mesic forest, river bottom forest and pure stands of prairie. Pine and oak barrens were also present on the driest sites. As elsewhere in southern Wisconsin, fire regime largely controlled the distribution of vegetation types. Natural subdivisions in this region are based primarily on presettlement vegetation.



Natural Subdivision 6c, formerly occupied by oak savanna, oak opening or oak forest, represents the largest portion of this region. Current stands are composed of same species as described for presettlement communities, but individual stands vary greatly as a result of differences in disturbance and seed source availability. White oak, white pine and red maple are reproducing most successfully on dry and dry-mesic sites. Northern pin oak also shows strong ability to persist, but jack pine and red pine show little natural generation.

Subdivision 6a was delineated on the basis of occurrence of presettlement sugar maple-basswood forest. Another large unit of Subdivision 6a, also based on distribution of presettlement maple-basswood forest, was delineated in region 7, but floristic composition of these two blocks of mesic forest differ in some respects. Red and white oak were described as important components of presettlement sugar maple-basswood forests, but these species are not regenerating naturally under current conditions. Bitternut hickory and American elm are the only common species, besides sugar maple and basswood, that are successfully regenerating in mesic stands.

Key to Habitat Types of Region 6 - Scientific Names (Key A)

Soils predominately sandy.
Species on right rarely present.

Deep sands with no groundwater influence or shallow soils over sandstone. Species on right rarely present. Any of the following present:

Fragaria vesca
Amorpha canescens
Parthenocissus quinquefolia

Euphorbia corollata
Cornus racemosa

Group on the right poorly represented.

Gaylussacia baccata
and
Pteridium aquilinum
commonly present and abundant.

Otherwise, herb layer is sparse with few species.

Two or more of the following present:

Dryopteris spinulosa
Cornus racemosa
Amorpha canescens
Prunus virginiana
Ilex verticillata
Vitis riparia
Parthenocissus quinquefolia

PVGy

3-23

PVCr

3-27

Group below well represented: Several species are found rather than any one being common.

Poorly represented: Usually no more than one species from the group present. Abundance may be low or high.

* - This species carries the most weight

(C) - Common: >1% coverage

Two or more present:

Dryopteris spinulosa
Geranium maculatum
Sanguinaria canadense
Desmodium glutinosum
Caulophyllum thalictroides

Sanicula sp.
Osmorhiza sp.
Thalictrum dioicum
Solidago flexicaulus

Go To Key B

Deep sands with groundwater influence or underlain by weathered shale or clay bands. Group below better represented than group on the left:

Mitchella repens
Osmunda claytoni
Rubus hispidus

Hamamelis virginiana
Cornus canadensis
Lycopodium obscurum

Group below better represented than group on right.

Coptis groenlandica
Clintonia borealis
Osmunda cinnamomea
Symplocarpus foetidus
Rubus hispidus

Groundwater influence within 3 feet of surface.

PVRh

3-29

Group below better represented than group on left.

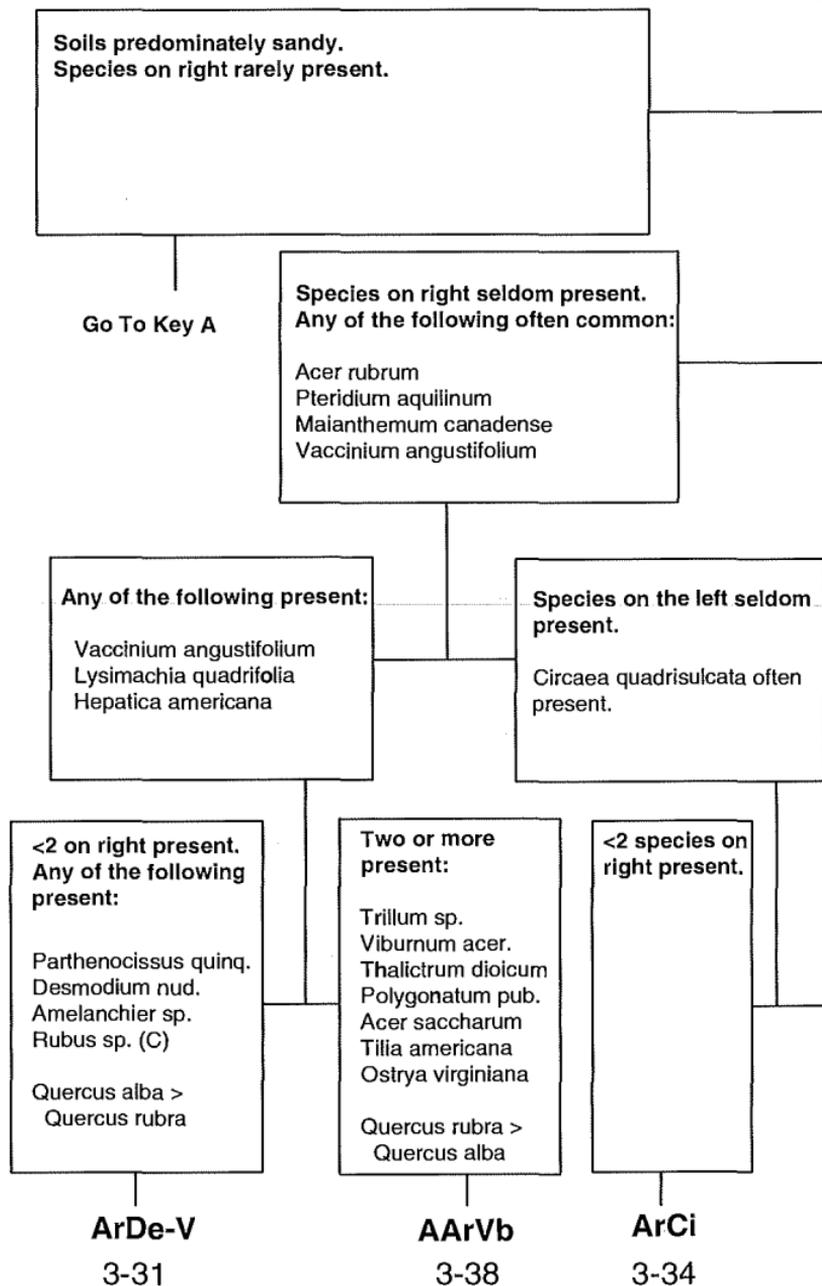
Diervilla lonicera
Viburnum acerifolium
Hamamelis virginiana
Aster macrophyllus

Clay bands or weathered shale within 4 feet common.

PVHa

3-25

Key to Habitat Types of Region 6 - Scientific Names (Key B)



Group below well represented: Several species are found rather than any one being common.

Poorly represented: Usually no more than one species from the group present. Abundance may be low or high.

* - This species carries the most weight. (C) - Common: >1% coverage.

Two or more present:

Dryopteris spinulosa Sanicula sp.
Geranium maculatum Osmorhiza sp.
Sanguinaria canadensis Thalictrum dioicum
Desmodium glutinosum Solidago flexicaulis
Caulophyllum thalictroides

Any of the following present:

Sanguinaria canadensis
Solidago flexicaulis
Caulophyllum thalictroides
Mitella nuda
Ranunculus hispidus
Hepatica acutiloba

**Group below
well represented:**

Desmodium sp.
Aster macrophyllus
Prunus serotina
Smilax herbacea
Ostrya virginiana
Geranium maculatum

**Species on the left
poorly represented.**

Laportea canadensis
is often abundant.

Two or more present:

Phryma leptostachya*
Sanicula sp.
Sambucus canadensis
Desmodium nudiflorum
Uvularia grandiflora
Aralia nudicaulis
Carya ovata

ArCi-Ph

3-34

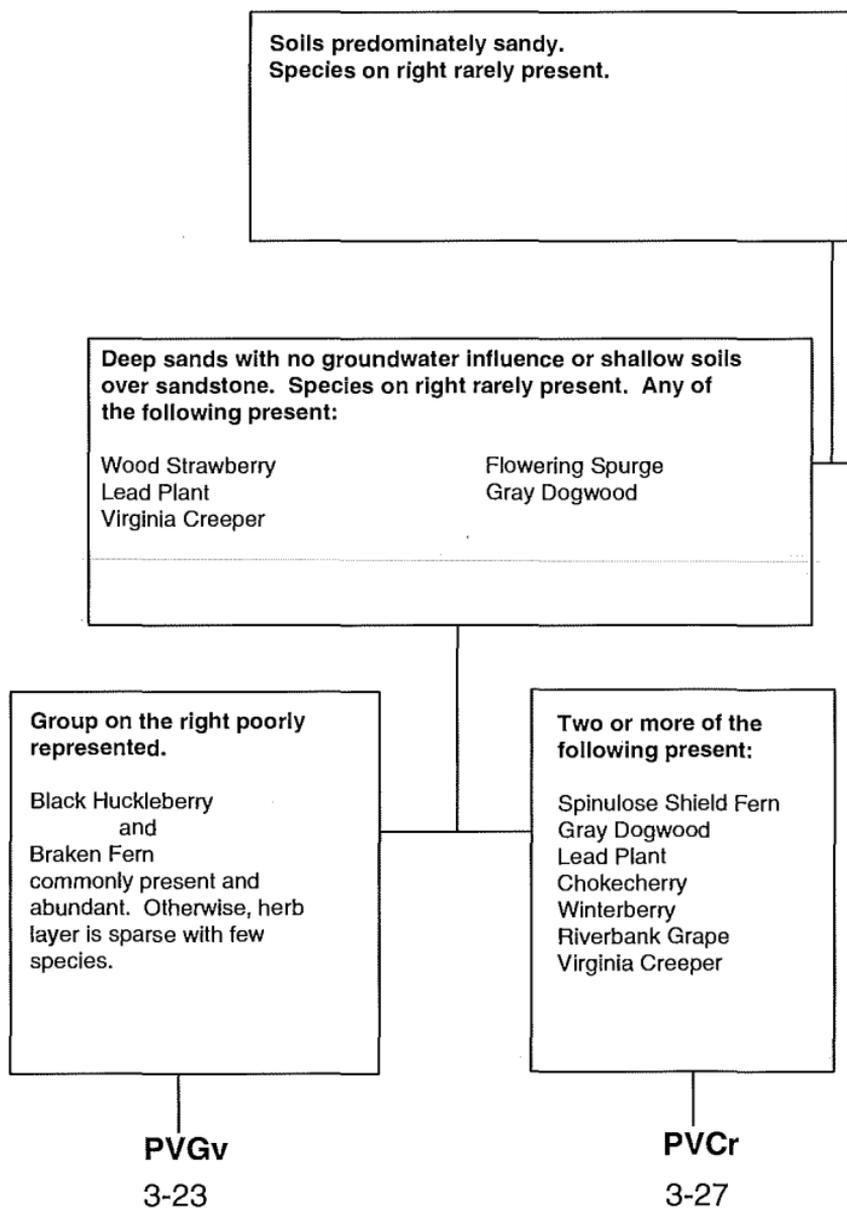
ATiSa-De

3-40

ATiCa-La

3-40

Key to Habitat Types of Region 6 - Common Names (Key A)



Group below well represented: Several species are found rather than any one being common.

Poorly represented: Usually no more than one species from the group present. Abundance may be low or high.

* - This species carries the most weight. (C) - Common; >1% coverage

Two or more present:

Spinulose Shield Fern
Wild Geranium
Bloodroot
Blue Cohosh
Pointed-leaved Tick Trefoil

Snakeroots
Sweet Cicely/Aniseroot
Early Meadow Rue
Zig-zag Goldenrod

Go To Key B

Deep sands with groundwater influence or underlain by weathered shale or clay bands. Group below better represented than group on the left:

Partridgeberry
Interrupted Fern
Swamp Dewberry

Witch Hazel
Bunchberry
Ground Pine

Group below better represented than group on right.

Goldthread
Yellow Beadlilly
Cinnamon Fern
Skunk Cabbage
Swamp Dewberry

Groundwater influence within 3 feet of surface.

PVRh

3-29

Group below better represented than group on left.

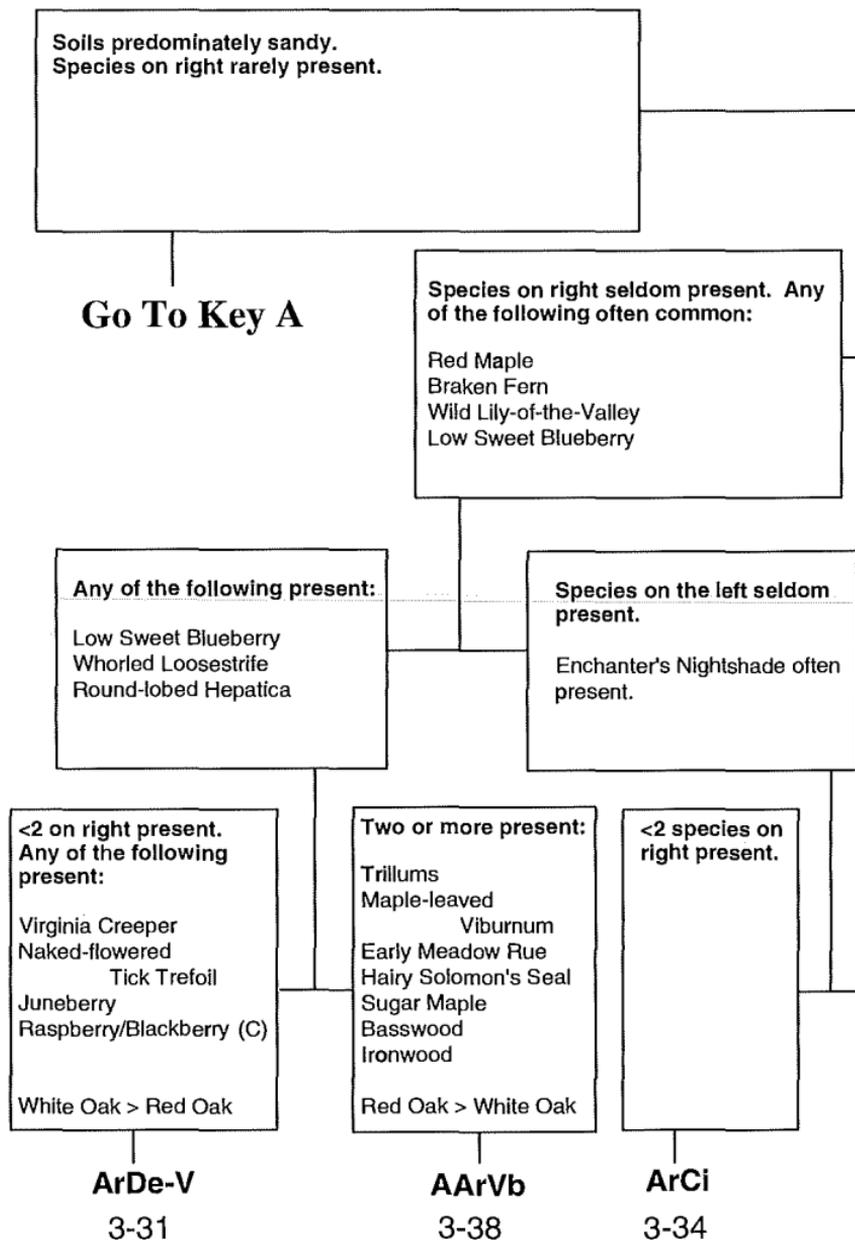
Bush Honeysuckle
Maple-leaved Viburnum
Witch Hazel
Large-leaved Aster

Clay bands or weathered shale within 4 feet common.

PVHa

3-25

Key to Habitat Types of Region 6 - Common Names (Key B)



Group below well represented: Several species are found rather than any one being common.

Poorly represented: Usually no more than one species from the group present. Abundance may be low or high.

* - This species carries the most weight. (C) - Common: >1% coverage.

Two or more present:

Spinulose Shield Fern Snakeroots
Wild Geranium Sweet Cicely/Aniseroot
Bloodroot Early Meadow Rue
Blue Cohosh Zig-zag Goldenrod
Pointed-leaved Tick Trefoil

Any of the following present:

Bloodroot
Zig-zag Goldenrod
Blue Cohosh
Naked Miterwort
Hispid Buttercup
Sharp-lobed Hepatica

Group below well represented:

Tick Trefoil
Large-leaved Aster
Black Cherry
Carrion Flower
Ironwood
Wild Geranium

Species on the left poorly represented.

Wood Nettle is often abundant.

Two or more present:

Lopseed*
Snakeroots
Common Elder
Naked-flowered
 Tick Trefoil
Large-flowered Bellwort
Wild Sarsaparilla
Shagbark Hickory

ArCi-Ph

3-34

ATiSa-De

3-40

ATiCa-La

3-40

Comparison of Major Floristic Differences Between Closely Related Habitat Types - Region 6

		PVGy	PVCr
Gaylussacia baccata	Black huckleberry	84,7	47,1
Lysimachia quadrifolia	Whorled loosestrife	69	35
Gaultheria procumbens	Wintergreen	55	17
Epigaea repens	Trailing arbutus	23	.
Smilacina racemosa	False solomon's seal	42	88
Aralia nudicaulis	Wild sarsaparilla	48	76
Cornus racemosa	Gray dogwood	7	76
Prunus virginiana	Chokecherry	12	76
Ilex verticillata	Winterberry	21	52
Parthenocissus quinq.	Virginia creeper	5	52
Amorpha canescens	Lead plant	10	35
Smilax tamnoides	Bristly greenbrier	5	35

		PVGy	PVHa
Aralia nudicaulis	Wild sarsaparilla	48	82
Aster macrophyllus	Large-leaved aster	28	72
Viburnum acerifolium	Maple-leaved viburnum	12	67
Hamamelis virginiana	Witch hazel	3,1	51,5
Osmunda claytoniana	Interrupted fern	1	46
Rubus hispidus	Swamp dewberry	3	41
Mitchella repens	Partridgeberry	7	40
Smilax tamnoides	Bristly greenbrier	5	35
Cornus canadensis	Bunchberry	.	25

		PVCr	PVRh
Smilacina racemosa	False solomon's seal	88	12
Cornus racemosa	Gray dogwood	76	.
Prunus virginiana	Chokecherry	76	6
Corylus americana	Hazel-nut	64	25
Rosa spp.	Roses	58	.
Parthenocissus quinq.	Virginia creeper	52	12
Diervilla lonicera	Bush honeysuckle	47	.
Trientalis borealis	Starflower	47	100
Rubus hispidus	Swamp dewberry	5	87
Gaylussacia baccata	Black huckleberry	47,1	75,7
Mitchella repens	Partridgeberry	17	75
Gaultheria procumbens	Wintergreen	17	62
Osmunda cinnamomea	Cinnamon fern	.	62
Lycopodium obscurum	Ground-pine	.	56
Cornus canadensis	Bunchberry	.	50
Coptis groenlandica	Goldthread	.	43
Clintonia borealis	Yellow beadlilly	.	37
Osmunda claytoniana	Interrupted fern	.	31
Aronia melanocarpa	Black chokeberry	5	31

		PVGy	PVRh
Apocynum andro.	Spreading dogbane	75	31
Rosa spp.	Roses	71	.
Lysimachia quadrifolia	Whorled loosestrife	69	18
Diervilla lonicera	Bush honeysuckle	44	.
Euphorbia corollata	Flowering spurge	35	.
Trientalis borealis	Starflower	41	100
Ilex verticillata	Winterberry	21	93
Rubus hispidus	Swamp dewberry	3	87

continued...

		PVGy	PVRh
Mitchella repens	Partridgeberry	7	75
Osmunda cinnamomea	Cinnamon fern	.	62
Lycopodium obscurum	Ground-pine	7	56
Cornus canadensis	Bunchberry	.	50
Coptis groenlandica	Goldthread	.	43
Clintonia borealis	Yellow beadlilly	1	37
Osmunda claytoniana	Interrupted fern	1	31
		PVCr	PVHa
Cornus racemosa	Gray dogwood	76	3
Prunus virginiana	Chokecherry	76	6
Parthenocissus quinq.	Virginia creeper	52	.
Amorpha canescens	Lead plant	35	.
Gaultheria procumbens	Wintergreen	17	82
Viburnum acerifolium	Maple-leaved viburnum	11	67
Hamamelis virginiana	Witch hazel	.	51
Osmunda claytoniana	Interrupted fern	.	46
Rubus hispidus	Swamp dewberry	5	41
Mitchella repens	Partridgeberry	17	40
Cornus canadensis	Bunchberry	.	25
		PVRh	PVHa
Ilex verticillata	Winterberry	93	40
Rubus hispidus	Swamp dewberry	87	41
Osmunda cinnamomea	Cinnamon fern	62,20	4,6
Coptis groenlandica	Goldthread	43	3
Clintonia borealis	Yellow beadlilly	37	1
Symplocarpus foetidus	Skunk cabbage	25	.
Dryopteris spinulosa	Spinulose shield fern	25	6
Aster macrophyllus	Large-leaved aster	37	72
Lysimachia quadrifolia	Whorled loosestrife	18	69
Viburnum acerifolium	Maple-leaved viburnum	.	67
Diervilla lonicera	Bush honeysuckle	.	51
Hamamelis virginiana	Witch hazel	6,1	51,5
		PVRh	ArDe-V
Trientalis borealis	Star flower	100	14
Ilex verticillata	Winterberry	93	23
Rubus hispidus	Swamp dewberry	87	.
Maianthemum canadense	Wild lily-of-the-valley	81	38
Mitchella repens	Partridgeberry	75	9
Gaylussacia baccata	Black huckleberry	75.7	47,1
Gaultheria procumbens	Wintergreen	62	.
Osmunda cinnamomea	Cinnamon fern	62	.
Lycopodium obscurum	Ground-pine	56	.
Cornus canadensis	Bunchberry	50	.
Coptis groenlandica	Goldthread	43	.
Desmodium glutinosum	Pointed-leaved tick trefoil	.	90
Diervilla lonicera	Bush honeysuckle	.	71
Geranium maculatum	Wild geranium	.	71
Smilacina racemosa	False solomon's seal	12	71
Cornus racemosa	Gray dogwood	.	66
Parthenocissus quinq.	Virginia creeper	12	66
Amphicarpa bracteata	Hog peanut	.	61
Osmorhiza claytoni	Sweet cicely	.	57
Desmodium nudiflorum	Naked-flowered tick trefoil	.	52
Viburnum acerifolium	Maple-leaved viburnum	.	38

continued...

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		PVHa	ArDe-V
Gaultheria procumbens	Wintergreen	82	.
Trientalis borealis	Star flower	67	14
Hamamelis virginiana	Witch hazel	51	4
Rubus hispidus	Swamp dewberry	41	.
Mitchella repens	Partridgeberry	40	9
Desmodium glutinosum	Pointed-leaved tick trefoil	4	90
Prunus virginiana	Chokecherry	6	80
Corylus americana	Hazel-nut	24	80
Smilacina racemosa	False solomon's seal	25	71
Geranium maculatum	Wild geranium	1	71
Cornus racemosa	Gray dogwood	3	66
Parthenocissus quinq.	Virginia creeper	.	66
Amphicarpa bracteata	Hog peanut	9	61
Lathyrus ochroleucus	Pale vetchling	3	61
Osmorhiza claytoni	Sweet cicely	.	57
Desmodium nudiflorum	Naked-flowered tick trefoil	1	52
Dryopteris spinulosa	Spinulose shield fern	6	42

		ArDe-V	ArCi
Vaccinium angust.	Low sweet blueberry	85	30
Pteridium aquilinum	Braken fern	86	61
Aralia nudicaulis	Wild sarsaparilla	76	23
Cornus racemosa	Gray dogwood	66	26
Lathyrus ochroleucus	Pale vetchling	61	.
Lysimachia quadrifolia	Whorled loosestrife	57	7
Desmodium nudiflorum	Naked-flowered tick trefoil	52	.
Gaylussacia baccata	Black huckleberry	47	3
Phryma leptostachya	Popseed	33	3
Circaea quadrisulcata	Enchanter's nightshade	23	76
Maianthemum canadense	Wild lily-of-the-valley	38	69
Viburnum lentago	Nannyberry	19	34

		AArVb	ArCi
Viburnum acerifolium	Maple-leaved viburnum	100	11
Polygonatum pubescens	Hairy solomon's seal	85	19
Aralia nudicaulis	Wild sarsaparilla	85	23
Corylus cornuta	Beaked hazelnut	71	19
Osmunda claytoniana	Interrupted fern	71	.
Trillium spp.	Trilliums	71	3
Vaccinium angust.	Low sweet blueberry	71	30
Thalictrum dioicum	Early meadow rue	57	19
Lonicera canadensis	American fly honeysuckle	57	3
Hepatica americana	Round-lobed hepatica	57	3
Cornus alternifolia	Alternate-leaved dogwood	42,5	19,1
Hepatica acutiloba	Sharp-lobed hepatica	42	.
Rubus spp.	Blackberries/raspberries	28	96
Parthenocissus quinq.	Virginia creeper	14	88
Circaea quadrisulcata	Enchanter's nightshade	28	76
Osmorhiza claytoni	Sweet cicely	28	73

		AArVb	ATICa-La
Aster macrophyllus	Large-leaved aster	100	10
Viburnum acerifolium	Maple-leaved viburnum	100	.
Desmodium glutinosum	Pointed-leaved tick trefoil	85	13
Prunus serotina	Black cherry	85	3
Polygonatum pubescens	Hairy solomon's seal	85	27

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		AArVb	ATiCa-La
<i>Aralia nudicaulis</i>	Wild sarsaparilla	85	10
<i>Osmunda claytoniana</i>	Interrupted fern	71	3
<i>Vaccinium angust.</i>	Low sweet blueberry	71	3
<i>Lonicera canadensis</i>	American fly honeysuckle	57	3
<i>Hepatica americana</i>	Round-lobed hepatica	57	.
<i>Osmorhiza claytoni</i>	Sweet cicely	28	79
<i>Sanguinaria canadensis</i>	Bloodroot	.	79
<i>Caulophyllum thal.</i>	Blue cohosh	14	72
<i>Asarum canadense</i>	Wild ginger	.	55
<i>Laportea canadensis</i>	Wood nettle	.	55,20
<i>Solidago flexicaulis</i>	Zigzag goldenrod	14	55
<i>Arisaema atrorubens</i>	Jack-in-the-pulpit	.	48
<i>Actaea spp.</i>	Baneberries	.	48
<i>Adiantum pedatum</i>	Maidenhair fern	.	44
<i>Mitella diphylla</i>	Miterwort	.	41
<i>Allium tricoccum</i>	Wild leek	.	34

		ARCI	ATiSa-De
<i>Maianthemum canadense</i>	Wild lily-of-the-valley	69	7
<i>Corylus americana</i>	Hazel-nut	69	28
<i>Uvularia sessilifolia</i>	Sessile-leaved bellwort	65	21
<i>Pteridium aquilinum</i>	Braken fern	61	10
<i>Ilex verticillata</i>	Winterberry	38	.
<i>Vaccinium angust.</i>	Low sweet blueberry	30	.
<i>Solidago flexicaulis</i>	Zigzag goldenrod	7	92
<i>Sanguinaria canadensis</i>	Bloodroot	3	92
<i>Sanicula marilandica</i>	Black snakeroot	19	92
<i>Thalictrum dioicum</i>	Early meadow rue	19	85
<i>Uvularia grandiflora</i>	Large-flowered bellwort	19	82
<i>Cornus alternifolia</i>	Alternate-leaved dogwood	19	78
<i>Adiantum pedatum</i>	Maidenhair fern	7	75
<i>Mitella diphylla</i>	Miterwort	.	75
<i>Asarum canadense</i>	Wild ginger	.	75
<i>Hepatica acutiloba</i>	Sharp-lobed hepatica	.	64
<i>Caulophyllum thal.</i>	Blue cohosh	7	57

		ARCI-Ph	ATiSa-De
<i>Phryma leptostachya</i>	Lopseed	82	35
<i>Galium triflorum</i>	Sweet-scented bedstraw	76	7
<i>Corylus americana</i>	Hazel-nut	73	28
<i>Cornus racemosa</i>	Gray dogwood	69	7
<i>Sambucus canadensis</i>	Common elder	54	.
<i>Desmodium nudiflorum</i>	Naked-flowered tick trefoil	45	3
<i>Pyrola spp.</i>	Pyrolas	41	.
<i>Maianthemum canadense</i>	Wild lily-of-the-valley	34	7
<i>Geum laciniatum</i>	Rough avens	32	.
<i>Apocynum andro.</i>	Spreading dogbane	32	3
<i>Sanguinaria canadensis</i>	Bloodroot	8	92
<i>Solidago flexicaulis</i>	Zigzag goldenrod	6	92
<i>Thalictrum dioicum</i>	Early meadow rue	30	85
<i>Cornus alternifolia</i>	Alternate-leaved dogwood	15	78
<i>Mitella diphylla</i>	Miterwort	.	75
<i>Adiantum pedatum</i>	Maidenhair fern	30	75
<i>Asarum canadense</i>	Wild ginger	2	75
<i>Trillium spp.</i>	Trilliums	6	71
<i>Hepatica acutiloba</i>	Sharp-lobed hepatica	.	64
<i>Caulophyllum thal.</i>	Blue cohosh	6	57
<i>Ranunculus hispidus</i>	Hispid buttercup	.	53

continued...

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		ArDe-V	AArVb
Rubus spp.	Blackberries/raspberries	100	28
Amelanchier spp.	Juneberry	85	14
Smilacina racemosa	False solomon's seal	71	28
Cornus racemosa	Gray dogwood	66	.
Parthenocissus quinq.	Virginia creeper	66	14
Lathyrus ochroleucus	Pale vetchling	61	.
Osmorhiza claytoni	Sweet cicely	57	28
Desmodium nudiflorum	Naked-flowered tick trefoil	52	.
Gaylussacia baccata	Black huckleberry	47	.
Smilax herbacea	Carriion flower	38	.
Apocynum andro.	Spreading dogbane	38	.
Phryma leptostachya	Lopseed	33	.
Viburnum acerifolium	Maple-leaved viburnum	38	100
Polygonatum pubescens	Hairy solomon's seal	28	85
Ribes spp.	Gooseberries	23	71
Osmunda claytoniana	Interrupted fern	28	71
Corylus cornuta	Beaked hazelnut	19	71
Trillium spp.	Trilliums	4	71

		ArDe-V	ArCi-Ph
Vaccinium angust.	Low sweet blueberry	85	13
Diervilla lonicera	Bush honeysuckle	71	36
Aster macrophyllus	Large-leaved aster	57,4	28,1
Gaylussacia baccata	Black huckleberry	47	.
Phryma leptostachya	Lopseed	33	82
Circaea quadrisulcata	Enchanter's nightshade	23	93
Sambucus canadensis	Common elder	9	54
Botrychium virginianum	Rattlesnake fern	4	41
Actaea spp.	Baneberries	9	32
Arisaema atrorubens	Jack-in-the-pulpit	4	32
Geum lacinatedum	Rough avens	4	32
Aralia racemosa	Spikenard	4	30
Agrimonia gryposepala	Agrimony	.	30

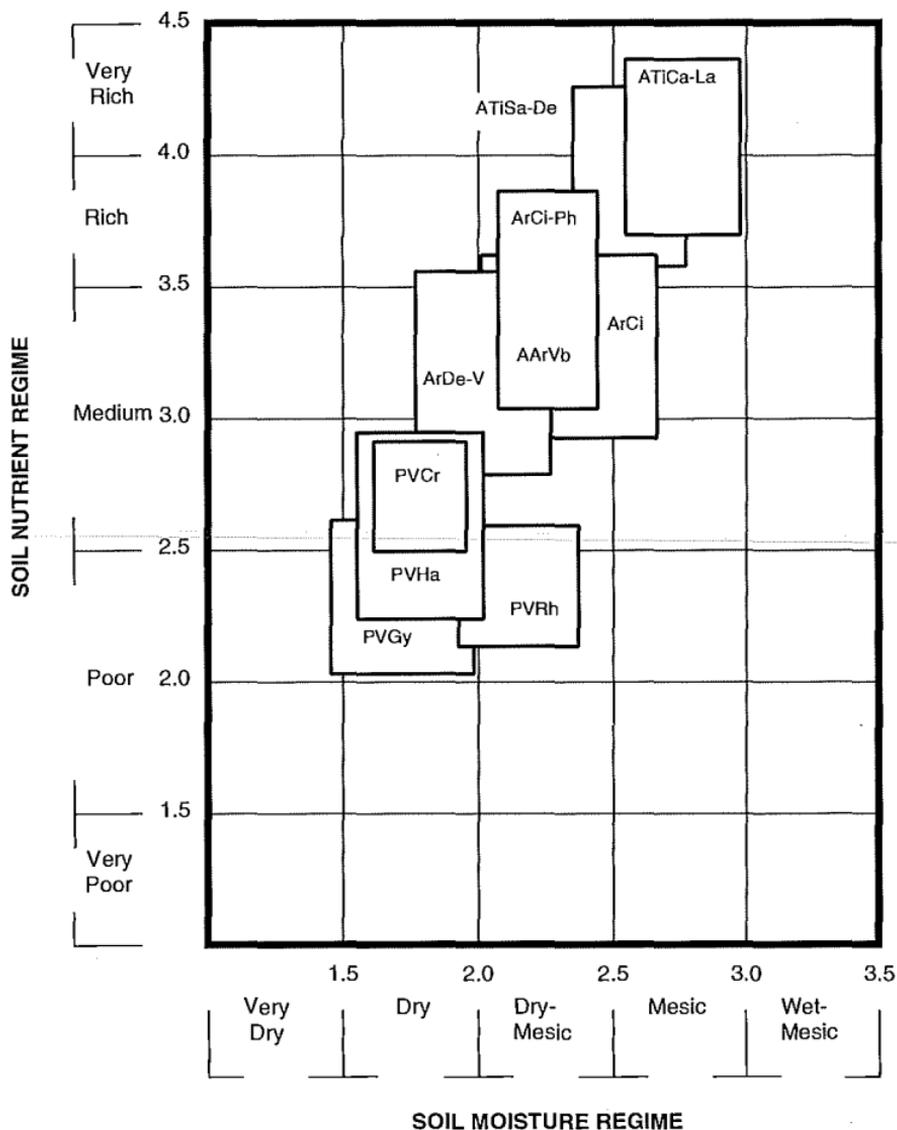
		AArVb	ArCi-Ph
Circaea quadrisulcata	Enchanter's nightshade	28	93
Osmorhiza claytoni	Sweet cicely	28	93
Geranium maculatum	Wild geranium	42	91
Phryma leptostachya	Lopseed	.	82
Parthenocissus quinq.	Virginia creeper	14	76
Cornus racemosa	Gray dogwood	.	69
Sanicula marilandica	Black snakeroot	28	63
Vitis riparia	Riverbank grape	.	58
Desmodium nudiflorum	Naked-flowered tick trefoil	.	45
Botrychium virginianum	Rattlesnake fern	.	41
Aster macrophyllus	Large-leaved aster	100	28
Viburnum acerifolium	Maple-leaved viburnum	100	19
Polygonatum pubescens	Hairy solomon's seal	85	17
Corylus cornuta	Beaked hazelnut	71	23
Osmunda claytoniana	Interrupted fern	71	30
Vaccinium angust.	Low sweet blueberry	71	13
Trillium spp.	Trilliums	71	6
Hepatica americana	Round-lobed hepatica	57	4
Lonicera canadensis	American fly honeysuckle	57	2
Hepatica acutiloba	Sharp-lobed hepatica	42	.

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		ArCi	ArCi-Ph
<i>Phryma leptostachya</i>	Lopseed	3	82
<i>Aralia nudicaulis</i>	Wild sarsaparilla	23	69
<i>Cornus racemosa</i>	Gray dogwood	26	69
<i>Sanicula marilandica</i>	Black snakeroot	19	63
<i>Uvularia grandiflora</i>	Large-flowered bellwort	19	56
<i>Sambucus canadensis</i>	Common elder	3	54
<i>Desmodium nudiflorum</i>	Naked-flowered tick trefoil	.	45
<i>Botrychium virginianum</i>	Rattlesnake fern	3	41
<i>Carya ovata</i>	Shagbark hickory	.	41
<i>Arisaema atrorubens</i>	Jack-in-the-pulpit	7	32
		ArCi	ATiCa-La
<i>Rubus</i> spp.	Blackberries/raspberries	96	6
<i>Desmodium glutinosum</i>	Pointed-leaved tick trefoil	69	13
<i>Maianthemum canadense</i>	Wild lily-of-the-valley	69	6
<i>Corylus americana</i>	Hazel-nut	69	.
<i>Uvularia sessilifolia</i>	Sessile-leaved bellwort	65	27
<i>Pteridium aquilinum</i>	Braken fern	61	.
<i>Trillium</i> spp.	Trilliums	3	79
<i>Sanguinaria canadensis</i>	Bloodroot	3	79
<i>Caulophyllum thal.</i>	Blue cohosh	7	72
<i>Hepatica acutiloba</i>	Sharp-lobed hepatica	.	58
<i>Asarum canadense</i>	Wild ginger	.	55
<i>Mitella diphylla</i>	Miterwort	.	41
<i>Allium tricoccum</i>	Wild leek	.	34
		ArCi-Ph	ATiCa-La
<i>Geranium maculatum</i>	Wild geranium	91	24
<i>Desmodium glutinosum</i>	Pointed-leaved tick trefoil	91	13
<i>Rubus</i> spp.	Blackberries/raspberries	84,5	6,1
<i>Phryma leptostachya</i>	Lopseed	82	13
Sedges spp.	Sedges	78	.
<i>Corylus americana</i>	Hazel-nut	73	.
<i>Cornus racemosa</i>	Gray dogwood	69	3
<i>Aralia nudicaulis</i>	Wild sarsaparilla	69	10
<i>Sambucus canadensis</i>	Common elder	54	.
<i>Desmodium nudiflorum</i>	Naked-flowered tick trefoil	45	.
<i>Sanguinaria canadensis</i>	Bloodroot	8	79
<i>Trillium</i> spp.	Trilliums	6	79
<i>Caulophyllum thal.</i>	Blue cohosh	6	72
<i>Hepatica acutiloba</i>	Sharp-lobed hepatica	.	58
<i>Solidago flexicaulis</i>	Zigzag goldenrod	6	55
<i>Asarum canadense</i>	Wild ginger	2	55
<i>Cornus alternifolia</i>	Alternate-leaved dogwood	15	51
<i>Mitella diphylla</i>	Miterwort	.	41
		ATiSa-De	ATiCa-La
<i>Laportea canadensis</i>	Wood nettle	7,2	55,20
<i>Arisaema atrorubens</i>	Jack-in-the-pulpit	25	48
<i>Solidago flexicaulis</i>	Zigzag goldenrod	92	55
<i>Sanicula marilandica</i>	Black snakeroot	92	48
<i>Uvularia grandiflora</i>	Large-flowered bellwort	82	48
<i>Smilax herbacea</i>	Carrion flower	78	37
<i>Geranium maculatum</i>	Wild geranium	78	24
<i>Desmodium glutinosum</i>	Pointed-leaved tick trefoil	78	13
<i>Ostrya virginiana</i>	Ironwood	67	10
<i>Aster macrophyllus</i>	Large-leaved aster	67	10
<i>Prunus serotina</i>	Black cherry	53	3
<i>Aralia nudicaulis</i>	Wild sarsaparilla	42	10
<i>Osmunda claytoniana</i>	Interrupted fern	32	3

Relationship of Habitat Types to Soil Moisture and Nutrient Regimes in Region 6



PVGy

Pinus strobus/Vaccinium-Gaylussacia (White pine/Blueberry-Huckleberry)

Distribution:

Most prevalent in Region 6, but also in northern parts of Region 7.
Natural subdivision 4a.

Similar Types: PVCr, PVHa

Landform And Soils:

Nearly level sand plains with sandstone buttes. Soil is sand or loamy sand, usually more than 3-4 feet deep. Well to excessively well drained. Representative soils are Tarr and Boone sand and loamy sand. The type is classified as **very dry to dry/poor nutrient**. Typical **PVGy** is found on flats and lower slopes. On steep upper slopes, S-SW aspects and narrow ridges a **xeric sub-type** of **PVGy** should be recognized. No plants consistently reflect these xeric conditions, but tree growth is strongly limited.

Vegetation:

Common Forest Cover Types: Various mixtures of *pin*s (*jack*, *red*, *white*), *pin oak*, *black oak* and *white oak* occur. Pines exhibit normal growth, but oaks only attain small stature and poor form. *Red maple* is present mostly as saplings. In the literature these communities are usually referred to as pine and oak barrens.

Shrub And Small Tree Layer: This layer is absent or poorly developed except for *huckleberry*. The following species are often present, but with low coverages: *serviceberry*, *black cherry*, *blackberries* and *raspberries*. *Red maple* and *black cherry* are often dominant.

Ground Flora Characteristics:

Except for *bracken fern*, herbs are largely absent or sparsely distributed. Most commonly found are: *common milkweed*, *whorled loosestrife* and *wild lily-of-the-valley*. Others, with even lower constancy are *wild sarsaparilla*, *false solomon's seal*, and *starflower*. Because only the most drought and low-nutrient tolerant species occur on the extreme end of this gradient plants cannot be used to further distinguish between "normal" and even more xeric sites. Therefore, when vegetation keys out to **PVGy** on steep upper slopes, S-SW aspects or narrow ridges, the site must be considered as a **xeric sub-type** of **PVGy** type.

Disturbance And Succession: All tree species occurring on this type are adapted to fire disturbance. In the absence of fire *white pine* appears to be best suited for reproduction in the understory and could be expected to dominate undisturbed stands. It is not yet very abundant in present stands but where seed source is present it shows vigorous development in the seedling and sapling layers. *White oak* also appears to regenerate well enough to remain as a permanent associate. *Red pine*, *jack pine*, and *black oak* would become less common. *Red maple* and *black cherry* are often well represented in the sapling layer but attain only small tree size on this type and can be expected to persist as understory associates.

PVGy

Understory species in order of decreasing constancy, with average coverage.

Scientific name	Common name	Constancy %	Coverage %
Herbs			
<i>Pteridium aquilinum</i>	Braken fern	91	15.71
Sedges spp.	Sedges	85	3.26
<i>Apocynum andro.</i>	Spreading dogbane	75	0.51
<i>Lysimachia quadrifolia</i>	Whorled loosestrife	69	0.56
<i>Maianthemum canadense</i>	Wild lily-of-the-valley	64	0.85
<i>Uvularia sessilifolia</i>	Sessile-leaved bellwort	64	0.50
<i>Gaultheria procumbens</i>	Wintergreen	55	0.58
<i>Aralia nudicaulis</i>	Wild sarsaparilla	48	1.24
Grasses spp.	Grasses	44	1.58
<i>Smilacina racemosa</i>	False solomon's seal	42	0.50
<i>Trientalis borealis</i>	Starflower	41	0.63
<i>Euphorbia corollata</i>	Flowering spurge	35	0.50
<i>Aster macrophyllus</i>	Large-leaved aster	28	0.66
<i>Anemone quinquefolia</i>	Wood anemone	23	0.50
<i>Epigaea repens</i>	Trailing arbutus	23	0.50
<i>Potentilla simplex</i>	Common cinquefoil	21	0.50
<i>Goodyera pubescens</i>	Downy rattlesnake plantain	19	0.50
<i>Aster sagittifolius</i>	Arrow-leaved aster	19	0.50
Shrubs			
<i>Vaccinium angust.</i>	Low sweet blueberry	98	2.87
<i>Amelanchier</i> spp.	Juneberry	87	0.96
<i>Gaylussacia baccata</i>	Black huckleberry	83	7.38
<i>Rosa</i> spp.	Roses	71	0.56
<i>Rubus</i> spp.	Blackberries/raspberries	66	2.09
<i>Diervilla lonicera</i>	Bush honeysuckle	44	0.50
<i>Corylus americana</i>	Hazel-nut	41	1.37
<i>Corylus cornuta</i>	Beaked hazelnut	21	2.75
<i>Ilex verticillata</i>	Winterberry	21	0.50
Tree Seedlings			
<i>Acer rubrum</i>	Red maple	78	1.25
<i>Prunus serotina</i>	Black cherry	67	0.76
<i>Pinus strobus</i>	White pine	67	1.41
<i>Quercus ellipsoidalis</i>	Northern pin oak	66	0.84
<i>Quercus alba</i>	White oak	55	1.69
<i>Populus grandidentata</i>	Bigtooth aspen	30	0.65

PVHa

Pinus/Vaccinium-Hamamelis (White pine/Blueberry-Witch hazel)

Distribution:

Primarily in eastern part of Eau Claire and NE Jackson counties and extending into SW Clark county. Corresponding closely to Natural Subdivision 2e.

Similar types: PVRh and PVGy

Landform and soils:

This habitat type is represented by two different types of substrate. **a)** Sandy to clayey loams over shaly sandstone. Bedrock is usually within 3 or 4 feet from surface. Moist or mottled layer is often present in lower C horizon. **b)** Loamy sand (sometimes with shaly-clay) usually over 4 feet deep with pronounced increase in moisture in the lower strata. Both conditions are classified as **dry/poor** to **medium nutrient**.

Vegetation:

Common forest cover types: Composition is similar to that of PVRh. *White pine*, *red maple* and *pin oak* are most common, but *white oak*, *red oak* and *aspen* also occur. Quality of stands varies greatly reflecting differences in past use, but all of above species show good growth in some stands.

Shrub and small tree layer: This layer is generally not dense. In terms of constancy values the following species are most common: *Service-berry*, *huckleberry*, *maple-leaf viburnum*, *black cherry*, *blackberries* and

raspberries, *witch hazel* and *beaked hazel*. Although their constancies are only moderate *Maple-leaf viburnum* and especially *witch hazel* are strong indicators of PVHa.

Caution: some stands on ridges, shallow soils or other extreme xeric sites may key out to PVHa by virtue of presence of *maple-leaf viburnum* (but not *witch hazel*). Such sites most likely represent a xeric sub-type of PVGy. (See description of PVGy).

Ground flora characteristics: With the exception of *bracken fern* and *wild sarsaparilla* herbs do not have high coverage. Other common species are: *Blueberries*, *wintergreen*, *sessile bellwort*, and *big-leaf aster*. There is a sporadic occurrence of some species that more strongly characterize the PVRh type e.g.: *starflower*, *swamp dewberry*, *partridgeberry*, and *winter-berry*.

Disturbance and succession: *White pine* is regenerating in all cover types if seed source is present. It is therefore considered as potential permanent and dominant component of any forest type. *Red maple* is probably the strongest potential associate, but only in the secondary canopy layer. *White* and especially *red oak* will likely decrease in importance without large scale disturbance.

PVHa

Understory species in order of decreasing constancy, with average coverage.

Scientific name	Common name	Constancy %	Coverage %
Herbs			
<i>Pteridium aquilinum</i>	Braken fern	95	9.01
<i>Gaultheria procumbens</i>	Wintergreen	82	0.60
Sedges spp.	Sedges	82	0.99
<i>Aralia nudicaulis</i>	Wild sarsaparilla	82	1.84
<i>Uvularia sessilifolia</i>	Sessile-leaved bellwort	79	0.71
<i>Aster macrophyllus</i>	Large-leaved aster	72	0.62
<i>Lysimachia quadrifolia</i>	Whorled loosetrife	69	0.50
<i>Trientalis borealis</i>	Star flower	67	0.50
<i>Maianthemum canadense</i>	Wild lily-of-the-valley	64	0.69
Grasses spp.	Grasses	64	0.57
<i>Osmunda claytoniana</i>	Interrupted fern	46	1.43
<i>Rubus hispidus</i>	Swamp dewberry	41	0.60
<i>Mitchella repens</i>	Partridgeberry	40	0.60
<i>Apocynum andro.</i>	Spreading dogbane	40	0.50
<i>Smilax tamnoides</i>	Bristly greenbrier	35	0.50
<i>Lycopodium obscurum</i>	Ground-pine	29	0.50
<i>Smilacina racemosa</i>	False solomon's seal	25	0.50
<i>Cornus canadensis</i>	Bunchberry	25	0.81
Shrubs			
<i>Amelanchier</i> spp.	Juneberry	98	1.87
<i>Vaccinium angust.</i>	Low sweet blueberry	98	0.87
<i>Viburnum acerifolium</i>	Maple-leaved viburnum	67	0.86
<i>Gaylussacia baccata</i>	Black huckleberry	66	3.43
<i>Rubus</i> spp.	Blackberries/raspberries	59	0.77
<i>Diervilla lonicera</i>	Bush honeysuckle	51	0.58
<i>Hamamelis virginiana</i>	Witch hazel	51	4.81
<i>Corylus cornuta</i>	Beaked hazelnut	41	1.44
<i>Ilex verticillata</i>	Winterberry	40	0.60
<i>Corylus americana</i>	Hazel-nut	24	0.83
<i>Rosa</i> spp.	Roses	20	0.50
Tree Seedlings			
<i>Acer rubrum</i>	Red maple	91	1.08
<i>Quercus alba</i>	White oak	79	1.01
<i>Prunus serotina</i>	Black cherry	61	0.71
<i>Pinus strobus</i>	White pine	59	1.23
<i>Quercus ellipsoidalis</i>	Northern pin oak	54	0.57
<i>Populus grandidentata</i>	Bigtooth aspen	45	0.59
<i>Crataegus</i> spp.	Hawthorns	27	0.53

PVCr

Pinus strobus/Vaccinium-Cornus racemosa (White pine/Blueberry-Gray dogwood)

Distribution:

Primarily in northern parts of Region 7 and throughout Region 6. Closely associated with Natural Subdivisions 4a and 6c.

Similar types: PVGy, PVHa

Landform and soils:

Rolling to hilly topography with sandstone outcrops. Soils are either thin loam or silt loam over deep sand, or over bedrock. Soil example is Eleva sandy loam. This type is classified as **dry/medium nutrient**.

Vegetation:

Common forest cover types: Mixtures of *white oak*, *black oak*, *pin oak* and *white pine* are most common. *Jack pine* is frequently present. *Red oak* is generally absent. *Red maple* is common and grows better than it does on **PVGy**, but less well than on **ArDe-V**. *Black cherry* is almost always present as saplings, but does not develop well into larger size class.

Shrub and small tree layer: This layer is much better represented on this type than it is on **PVGy**.

Most diagnostic in this respect are *gray dogwood* and *choke cherry*. *Black cherry* is also better represented on **PVCr**. Other important species are *blackberries* and *raspberries*, *hazel* and *Serviceberry*.

Ground flora characteristics:

Herbaceous layer is poorly developed on this type. A few species are better represented on this type than they are on the **PGy** and are useful for identification. These are *wild sarsaparilla*, *true solomon's seal* and *Virginia creeper*.

Disturbance and succession:

All tree species occurring on this type are adapted to fire disturbance. The relative frequency and intensity of fire probably controlled community composition in presettlement time. There is no evidence to suggest that in the absence of fire the same species, with the exception of *jack pine*, could not maintain themselves on this type. *White pine*, because of its much larger stature and longer life span than other species, is presumed to be a potential dominant.

PVCr

Understory species in order of decreasing constancy, with average coverage.

Scientific name	Common name	Constancy %	Coverage %
Herbs			
Sedges spp.	Sedges	100	2.24
<i>Smilacina racemosa</i>	False solomon's seal	88	0.50
<i>Pteridium aquilinum</i>	Braken fern	88	10.63
<i>Maianthemum canadense</i>	Wild lily-of-the-valley	76	0.69
<i>Aralia nudicaulis</i>	Wild sarsaparilla	76	3.69
<i>Uvularia sessilifolia</i>	Sessile-leaved bellwort	58	1.00
<i>Apocynum andro.</i>	Spreading dogbane	58	0.50
<i>Parthenocissus quinq.</i>	Virginia creeper	52	0.78
<i>Aster macrophyllus</i>	Large-leaved aster	47	0.81
<i>Trientalis borealis</i>	Starflower	47	0.50
<i>Lysimachia quadrifolia</i>	Whorled loosestrife	35	0.50
<i>Smilax tamnoides</i>	Bristly greenbrier	35	0.50
<i>Lathyrus ochroleucus</i>	Pale vetchling	29	0.50
<i>Pyrola</i> spp.	Pyrolas	29	0.50
<i>Vitis riparia</i>	Riverbank grape	29	0.50
<i>Dryopteris spinulosa</i>	Spinulose shield fern	29	0.50
<i>Euphorbia corollata</i>	Flowering spurge	29	0.50
Grasses spp.	Grasses	29	0.50
<i>Goodyera pubescens</i>	Downy rattlesnake plantain	23	0.50
<i>Galium triflorum</i>	Sweet-scented bedstraw	23	0.50
<i>Galium boreale</i>	Northern bedstraw	23	0.50
<i>Geranium maculatum</i>	Wild geranium	23	0.50
<i>Smilax herbacea</i>	Carrion flower	23	0.50
<i>Fragaria vesca</i>	Wood strawberry	23	0.50
Shrubs			
<i>Rubus</i> spp.	Blackberries/raspberries	88	2.63
<i>Amelanchier</i> spp.	Juneberry	88	1.33
<i>Vaccinium angust.</i>	Low sweet blueberry	82	1.21
<i>Cornus racemosa</i>	Gray dogwood	76	1.81
<i>Prunus virginiana</i>	Chokecherry	76	0.88
<i>Corylus americana</i>	Hazel-nut	64	2.27
<i>Rosa</i> spp.	Roses	58	0.75
<i>Ilex verticillata</i>	Winterberry	52	0.50
<i>Gaylussacia baccata</i>	Black huckleberry	47	1.13
<i>Diervilla lonicera</i>	Bush honeysuckle	47	1.44
<i>Amorpha canescens</i>	Lead plant	35	0.50
<i>Corylus cornuta</i>	Beaked hazelnut	29	1.00
<i>Crataegus</i> spp.	Hawthorns	23	0.50
Tree Seedlings			
<i>Quercus alba</i>	White oak	100	1.94
<i>Prunus serotina</i>	Black cherry	100	2.94
<i>Acer rubrum</i>	Red maple	70	0.71
<i>Pinus strobus</i>	White pine	52	0.78
<i>Quercus ellipsoidalis</i>	Northern pin oak	47	0.81
<i>Quercus velutina</i>	Black oak	23	1.13

PVRh

Pinus strobus/Vaccinium-Rubus hispidus (White pine/Blueberry-Dewberry)

Distribution:

Mostly in Jackson county (E of Black River). Natural Subdivision 4a.

Similar types: PVGy, PVHa

Landform and soils:

Nearly level sand plains with sandstone buttes. Similar topography and surface soil as described for **PVGy**. However, on **PVRh** sites ground water influence is near the surface - usually within 3 feet. Soil examples are Fairchild, Iron run and Merrillan. In spite of ground water influence vegetation on these sandy soils is decidedly xerophytic. The type is classified as **dry-mesic/poor nutrient**.

Vegetation:

Common forest cover types:

White pine, *red maple* and *pin oak*, in various mixtures, are most common dominants in current stands. *White oak* and *jack pine* are common associates, *red oak* is usually absent.

Shrub and small tree layer: This layer is generally absent or poorly developed. *Huckleberry* is often conspicuous but other species have low coverage. Those with high constancy are *black cherry*, *serviceberry* and *winterberry (Ilex)*.

Winterberry is best represented on this type. Conspicuously rare are *gray dogwood*, *chokecherry* and *hazel*. All of these are usually well represented on dry and dry-mesic sites.

Ground flora characteristics:

The following group of species with moderate individual constancy values readily distinguish this type from other types in this region: *Partridgeberry*, *swamp dewberry*, *starflower*, *ground pine (Lycopodium obscurum)*, *gold-thread*, *bunchberry* and *yellow beadlily*. These species are characteristic members of northern forests and are rarely found in southern habitat types. *Cinnamon fern* sometimes dominates herb layer, especially where ground water is near the surface.

Disturbance and succession:

Records of presettlement conditions show *white pine* as the dominant species on this habitat type. *Red maple* and *pin oak* were probably always present, but assumed dominance after *white pine* was logged off. Since then *white pine* seed source has slowly increased and *white pine* regeneration is now common in many stands.

PVRh

Understory species in order of decreasing constancy, with average coverage.

Scientific name	Common name	Constancy %	Coverage %
Herbs			
<i>Trientalis borealis</i>	Starflower	100	0.50
<i>Aralia nudicaulis</i>	Wild sarsaparilla	87	0.86
<i>Rubus hispidus</i>	Swamp dewberry	87	1.71
<i>Maianthemum canadense</i>	Wild lily-of-the-valley	81	2.58
<i>Uvularia sessilifolia</i>	Sessile-leaved bellwort	81	0.69
<i>Mitchella repens</i>	Partridgeberry	75	0.50
<i>Pteridium aquilinum</i>	Braken fern	75	9.13
<i>Gaultheria procumbens</i>	Wintefgreen	62	0.50
<i>Osmunda cinnamomea</i>	Cinnamon fern	62	20.00
<i>Lycopodium obscurum</i>	Ground-pine	56	0.50
Sedges spp.	Sedges	56	0.50
<i>Cornus canadensis</i>	Bunchberry	50	1.44
<i>Coptis groenlandica</i>	Goldthread	43	3.29
Grasses spp.	Grasses	37	0.50
<i>Clintonia borealis</i>	Yellow beadlilly	37	0.50
<i>Aster macrophyllus</i>	Large-leaved aster	37	0.50
<i>Apocynum andro.</i>	Spreading dogbane	31	0.50
<i>Anemone quinquefolia</i>	Wood anemone	31	0.50
<i>Osmunda claytoniana</i>	Interrupted fern	31	1.50
<i>Cypripedium acaule</i>	Pink lady's slipper	25	1.13
<i>Viola</i> spp.	Violets	25	0.50
<i>Symplocarpus foetidus</i>	Skunk cabbage	25	4.75
<i>Dryopteris spinulosa</i>	Spinulose shield fern	25	1.75
<i>Pyrola</i> spp.	Pyrolas	18	0.50
<i>Lysimachia quadrifolia</i>	Whorled loosestrife	18	0.50
<i>Prenanthes alba</i>	White lettuce	18	0.50
Shrubs			
<i>Ilex verticillata</i>	Winterberry	93	1.50
<i>Vaccinium angust.</i>	Low sweet blueberry	87	0.86
<i>Amelanchier</i> spp.	Juneberry	81	0.69
<i>Gaylussacia baccata</i>	Black huckleberry	75	6.63
<i>Rubus</i> spp.	Blackberries/raspberries	43	2.57
<i>Aronia melanocarpa</i>	Black chokeberry	31	0.60
<i>Corylus americana</i>	Hazel-nut	25	0.50
<i>Corylus cornuta</i>	Beaked hazelnut	25	0.50
Tree Seedlings			
<i>Acer rubrum</i>	Red maple	93	0.83
<i>Pinus strobus</i>	White pine	81	2.38
<i>Quercus ellipsoidalis</i>	Northern pin oak	75	0.50
<i>Prunus serotina</i>	Black cherry	75	0.50
<i>Quercus alba</i>	White oak	68	0.95
<i>Populus grandidentata</i>	Bigtooth aspen	37	0.50

ArDe-V

***Acer rubrum*/Desmodium habitat type, *Vaccinium* variant (Red maple/Pointed-leaf tick trefoil, Blueberry variant)**

Distribution:

Mainly in W Jackson, Trempealeau and Eau Claire counties, but also scattered in other counties of Natural Subdivision 6c. Also in northern and western parts of Habitat type Region 7.

Similar types: PVCr

Landform and soils:

Rolling to hilly topography with sandstone and sometimes dolomitic bedrock. Soils are sandy loam to loam (typical example: Hixton loam). This type represents a distinct **transition between dry and dry-mesic sites**.

Vegetation:

Major forest cover types: *White oak* and *red maple* are the most common dominants in stands that were sampled, but *red oak* is sometimes present. *Pin oak* or *black oak* are much less common than they are on **PVCr** type. *White pine* is often present.

Shrub and small tree layer: This layer is usually well represented. Major species in decreasing order of average coverage are: *Hazel*, *blackberries* and *raspberries*, *serviceberry*, *black cherry*, *gray dogwood* and *bush honeysuckle*. *Red maple* saplings often dominate this layer.

Ground flora characteristics: Number of species and total herb coverage is higher than on other dry types of this region. *Blueberry* occurs here

with small coverage and helps to distinguish **ArDe-V** from **ArCi** and other dry-mesic and mesic types. The species that best distinguishes this type from drier types is *pointed-leaf tick trefoil*. Other diagnostic species with lower constancies are *sweet cicely*, *wild geranium* and *hog peanut*. Best represented species are *bracken fern*, *big-leaf aster*, *tick trefoil*, *wild sarsaparilla* and *Virginia creeper*.

Disturbance and succession: Pre-settlement fire regime favored development of oak communities. *Red oak* is not reproducing adequately in current stands even when *red oak* is dominant in the overstory. *White oak*, however, shows some ability to persist. The most successfully reproducing species is *red maple*. Based on understory composition and soil characteristics we conclude that *sugar maple* is not a potential climax dominant on this type. *Red maple* is the most shade tolerant species that is well adapted to these sites and is presumed to be climax. It is also possible that *white pine* can again become a permanent member of communities on this type once it can be established as a seed source. Competitive relationship between *white pine* and *red maple* on this type has not been established, however, it appears that under a disturbance regime of moderate fire frequency the two species would co-exist.

ArDe-V

Understory species in order of decreasing constancy, with average coverage.

Scientific name	Common name	Constancy %	Coverage %
Herbs			
Sedges spp.	Sedges	95	0.63
Desmodium glutinosum	Pointed-leaved tick trefoil	90	2.18
Pteridium aquilinum	Braken fern	85	6.31
Aralia nudicaulis	Wild sarsaparilla	76	1.13
Smilacina racemosa	False solomon's seal	71	0.67
Geranium maculatum	Wild geranium	71	0.67
Parthenocissus quinquefolia	Virginia creeper	66	1.89
Amphicarpa bracteata	Hog peanut	61	0.50
Lathyrus ochroleucus	Pale vetchling	61	0.50
Osmorhiza claytoni	Sweet cicely	57	0.50
Aster macrophyllus	Large-leaved aster	57	4.25
Uvularia sessilifolia	Sessile-leaved bellwort	57	1.92
Lysimachia quadrifolia	Whorled loosestrife	57	0.50
Desmodium nudiflorum	Naked-flowered tick trefoil	52	2.27
Goodyera pubescens	Downy rattlesnake plantain	47	0.50
Grasses spp.	Grasses	47	0.50
Pyrola spp.	Pyrolas	47	0.50
Galium triflorum	Sweet-scented bedstraw	42	0.50
Dryopteris spinulosa	Spinulose shield fern	42	0.50
Smilax herbacea	Carrion flower	38	0.50
Apocynum androsaemifolium	Spreading dogbane	38	0.81
Maianthemum canadense	Wild lily-of-the-valley	38	0.50
Anemone quinquefolia	Wood anemone	38	0.50
Potentilla simplex	Common cinquefoil	33	0.50
Fragaria vesca	Wood strawberry	33	0.50
Asclepias spp.	Milkweeds	33	0.50
Solidago spp.	Goldenrods	33	0.50
Phryma leptostachya	Lopseed	33	0.50
Osmunda claytoniana	Interrupted fern	28	1.33
Hepatica americana	Round-lobed hepatica	28	0.50
Polygonatum pubescens	Hairy solomon's seal	28	0.50
Vitis riparia	Riverbank grape	28	0.50
Viola spp.	Violets	23	0.50
Circaea quadrisulcata	Enchanter's nightshade	23	0.50
Rhus radicans	Poison ivy	23	0.50
Uvularia grandiflora	Large-flowered bellwort	23	0.50
Smilax tamnoides	Bristly greenbrier	23	0.50
Sanicula marilandica	Black snakeroot	23	0.50
Shrubs			
Rubus spp.	Blackberries/raspberries	100	3.79
Vaccinium angustifolium	Low sweet blueberry	85	0.50
Amelanchier spp.	Juneberry	85	4.44
Corylus americana	Hazel-nut	80	7.50
Prunus virginiana	Chokecherry	80	0.65
Diervilla lonicera	Bush honeysuckle	71	0.83
Cornus racemosa	Gray dogwood	66	1.89

Scientific name	Common name	Constancy %	Coverage %
<i>Rosa</i> spp.	Roses	66	0.50
<i>Gaylussacia baccata</i>	Black huckleberry	47	0.75
<i>Viburnum acerifolium</i>	Maple-leaved viburnum	38	0.81
<i>Viburnum rafinesquianum</i>	Downy arrowwood	28	0.92
<i>Ilex verticillata</i>	Winterberry	23	1.00
<i>Ribes</i> spp.	Gooseberries	23	0.50
Tree Seedlings			
<i>Prunus serotina</i>	Black cherry	95	1.38
<i>Acer rubrum</i>	Red maple	95	1.13
<i>Quercus alba</i>	White oak	80	0.94
<i>Quercus velutina</i>	Black oak	38	0.50
<i>Quercus rubra</i>	Northern red oak	38	0.50
<i>Carya ovata</i>	Shagbark hickory	33	0.86
<i>Populus grandidentata</i>	Bigtooth aspen	33	0.50
<i>Carya cordiformis</i>	Bitternut hickory	23	0.50
<i>Ulmus</i> spp.	Elms	23	0.50
<i>Crataegus</i> spp.	Hawthorns	28	0.50

ArCi and ArCi-Ph

Acer rubrum/Circaea community type (Red maple/Enchanters nightshade) and *Phryma* (Lopseed) variant

Distribution:

ArCi type occurs primarily in the NW parts of region 6 (Chippewa, Dunn, Eau Claire, Pepin counties), while **ArCi-Ph** is common in Jackson (west of Black River) and Trempealeau counties and in region 7. Natural Sub-division 6c.

Similar types: ATiDe, ATiDe(Pr)

Landform and soils:

Both types occur on rolling to hilly sandstone terrain. **ArCi** is commonly found on loamy soils and **ArCi-Ph** where thin silt loam cap is present. Both types are classified as **dry-mesic, medium to rich**.

Vegetation:

Major forest cover types: *Red oak*, *white oak* and *red maple*, in relatively pure stands or in mixtures, are most common. Mesic hardwoods (*sugar maple*, *basswood*, *white ash*) or *shag-bark hickory* sporadically occur in some stands on the **ArCi-Ph** type.

Shrub and small tree layer: This layer is usually well developed. Principal species in descending order of average coverage are: *blackberry/raspberry*, *hazel*, *gooseberry*, *gray dogwood*, *serviceberry*, and *choke cherry*. However, *red maple* and *black cherry* saplings often dominate this layer.

Ground flora characteristics: Both types are distinguished from drier

types of this region by generally lacking *blueberry* and *huckleberry*. Similarly, they are distinguished from the mesic types by general lack of the *blue cohosh* ecological species group (see **ATiCa** type). Most characteristic species are *nightshade*, *Virginia creeper*, *sweet cicely*, *wild geranium*, and *gooseberries*. **ArCi-Ph** is usually distinguishable from **ArCi** by presence of *lopseed* (*Phryma*). Other floristic differences between the two variants are subtle. **ArCi** contains several species of predominantly northern distribution while **ArCi-Ph** contains many of predominantly southern distribution (See constancy table).

Disturbance and succession: As is the case with several other plant association described in this field guide the climax nature of these two community types has not been adequately studied. The soils do not appear different from those that support tolerant mesic species in other parts of the region. However, these species are generally not found in this community type and *red maple* is presently the most common species capable of reproducing in present oak stands. For these reasons the type is referred to as "community type" rather than habitat type and *red maple* can perhaps be viewed as a "pseudo-climax" until *sugar maple* seed source once again becomes common on sites where fire once controlled community dynamics.

ArCi

Understory species in order of decreasing constancy, with average coverage.

Scientific name	Common name	Constancy %	Coverage %
Herbs			
<i>Circaea quadrifida</i>	Enchanter's nightshade	76	1.10
<i>Osmorhiza claytoni</i>	Sweet cicely	73	0.67
<i>Desmodium glutinosum</i>	Pointed-leaved tick trefoil	69	1.79
<i>Maianthemum canadense</i>	Wild lily-of-the-valley	69	0.43
<i>Uvularia sessilifolia</i>	Sessile-leaved bellwort	65	3.42
<i>Amphicarpa bracteata</i>	Hog peanut	65	3.47
Grasses spp.	Grasses	61	1.74
<i>Geranium maculatum</i>	Wild geranium	61	1.29
<i>Pteridium aquilinum</i>	Braken fern	61	1.71
<i>Aster macrophyllus</i>	Large-leaved aster	50	3.11
<i>Parthenocissus quinquefolia</i>	Virginia creeper	88	2.73
<i>Smilacina racemosa</i>	False solomon's seal	46	0.47
<i>Anemone quinquefolia</i>	Wood anemone	42	0.42
<i>Galium boreale</i>	Northern bedstraw	38	0.25
<i>Vitis riparia</i>	Riverbank grape	38	0.54
<i>Rhus radicans</i>	Poison ivy	38	1.94
<i>Smilax herbacea</i>	Carrion flower	38	0.15
<i>Fragaria vesca</i>	Wood strawberry	38	0.54
<i>Viola</i> spp.	Violets	34	0.27
<i>Prenanthes alba</i>	White lettuce	30	0.10
<i>Galium triflorum</i>	Sweet-scented bedstraw	30	0.35
<i>Dryopteris spinulosa</i>	Spinulose shield fern	30	3.54
<i>Trientalis borealis</i>	Starflower	26	0.17
<i>Actaea</i> spp.	Baneberries	26	0.10
<i>Solidago</i> spp.	Goldenrods	23	0.18
<i>Aralia nudicaulis</i>	Wild sarsaparilla	23	1.32
<i>Smilax tamnoides</i>	Bristly greenbrier	23	0.35
<i>Pyrola</i> spp.	Pyrolas	23	0.18
Shrubs			
<i>Rubus</i> spp.	Blackberries/raspberries	96	2.52
<i>Prunus virginiana</i>	Chokecherry	84	1.86
<i>Corylus americana</i>	Hazel-nut	69	4.92
<i>Ribes</i> spp.	Gooseberries	61	1.61
<i>Amelanchier</i> spp.	Juneberry	53	2.69
<i>Ilex verticillata</i>	Winterberry	38	0.49
<i>Viburnum lentago</i>	Nannyberry	34	2.62
<i>Vaccinium angustifolium</i>	Low sweet blueberry	30	0.77
<i>Cornus racemosa</i>	Gray dogwood	26	2.59
<i>Xanthoxylum americanum</i>	Prickly ash	26	3.20
<i>Diervilla lonicera</i>	Bush honeysuckle	23	2.67
Tree Seedlings			
<i>Prunus serotina</i>	Black cherry	92	2.42
<i>Acer rubrum</i>	Red maple	84	1.05
<i>Quercus alba</i>	White oak	50	1.04
<i>Quercus rubra</i>	Northern red oak	38	0.49
<i>Ulmus americana</i>	American elm	26	1.49

ArCi-Ph

Understory species in order of decreasing constancy, with average coverage.

Scientific name	Common name	Constancy %	Coverage %
Herbs			
<i>Circaea quadrifida</i>	Enchanter's nightshade	93	1.88
<i>Osmorhiza claytoni</i>	Sweet cicely	93	1.26
<i>Geranium maculatum</i>	Wild geranium	91	2.15
<i>Desmodium glutinosum</i>	Pointed-leaved tick trefoil	91	1.98
<i>Amphicarpa bracteata</i>	Hog peanut	84	1.77
<i>Phryma leptostachya</i>	Lopseed	82	1.21
Sedges spp.	Sedges	78	0.50
<i>Parthenocissus quinquefolia</i>	Virginia creeper	76	2.73
<i>Galium triflorum</i>	Sweet-scented bedstraw	76	0.57
<i>Viola</i> spp.	Violets	71	0.50
<i>Aralia nudicaulis</i>	Wild sarsaparilla	69	1.44
<i>Dryopteris spinulosa</i>	Spinulose shield fern	65	1.65
<i>Sanicula marilandica</i>	Black snakeroot	63	0.59
<i>Vitis riparia</i>	Riverbank grape	58	0.59
<i>Smilax herbacea</i>	Carrion flower	56	0.50
<i>Uvularia grandiflora</i>	Large-flowered bellwort	56	0.69
<i>Uvularia sessilifolia</i>	Sessile-leaved bellwort	52	0.60
Grasses spp.	Grasses	47	0.61
<i>Desmodium nudiflorum</i>	Naked-flowered tick trefoil	45	0.62
<i>Smilacina racemosa</i>	False solomon's seal	43	0.63
<i>Pyrola</i> spp.	Pyrolas	41	0.63
<i>Botrychium virginianum</i>	Rattlesnake fern	41	0.50
<i>Pteridium aquilinum</i>	Braken fern	36	1.09
<i>Athyrium filix-femina</i>	Lady fern	34	1.72
<i>Maianthemum canadense</i>	Wild lily-of-the-valley	34	0.81
<i>Urtica procera</i>	Tall nettle	32	0.50
<i>Geum laciniatum</i>	Rough avens	32	0.50
<i>Actaea</i> spp.	Baneberries	32	0.67
<i>Arisaema atrorubens</i>	Jack-in-the-pulpit	32	0.50
<i>Apocynum androsaemifolium</i>	Spreading dogbane	32	0.50
<i>Osmunda claytoniana</i>	Interrupted fern	30	1.89
<i>Thalictrum dioicum</i>	Early meadow rue	30	0.50
<i>Potentilla simplex</i>	Common cinquefoil	30	0.50
<i>Adiantum pedatum</i>	Maidenhair fern	30	0.50
<i>Aralia racemosa</i>	Spikenard	30	2.93
<i>Agrimonia gryposepala</i>	Agrimony	30	0.50
<i>Rhus radicans</i>	Poison ivy	28	4.65
<i>Aster macrophyllus</i>	Large-leaved aster	28	0.69
<i>Solidago</i> spp.	Goldenrods	28	0.54
<i>Galium boreale</i>	Northern bedstraw	26	0.50
<i>Lysimachia quadrifolia</i>	Whorled loosestrife	23	0.50
<i>Lathyrus ochroleucus</i>	Pale vetchling	23	0.50
<i>Anemone quinquefolia</i>	Wood anemone	23	0.50
<i>Fragaria vesca</i>	Wood strawberry	21	0.50
<i>Smilax tamnoides</i>	Bristly greenbrier	21	0.50

Scientific name	Common name	Constancy %	Coverage %
Shrubs			
Rubus spp.	Blackberries/raspberries	84	4.94
Corylus americana	Hazel-nut	73	2.10
Prunus virginiana	Chokecherry	71	0.95
Cornus racemosa	Gray dogwood	69	1.27
Ribes spp.	Gooseberries	60	2.25
Sambucus canadensis	Common elder	54	0.60
Amelanchier spp.	Juneberry	54	1.18
Rosa spp.	Roses	45	0.86
Diervilla lonicera	Bush honeysuckle	36	0.94
Viburnum lentago	Nannyberry	34	0.50
Salix humilis	Prairie willow	26	0.50
Corylus cornuta	Beaked hazelnut	23	2.95
Tree Seedlings			
Prunus serotina	Black cherry	91	0.74
Acer rubrum	Red maple	76	0.94
Ulmus spp.	Elms	60	0.68
Carya ovata	Shagbark hickory	41	0.76
Quercus alba	White oak	36	0.68
Populus grandidentata	Bigtooth aspen	34	0.50
Acer negundo	Box elder	32	0.50
Tilia americana	Basswood	30	0.50
Quercus rubra	Northern red oak	23	0.50
Carya cordiformis	Bitternut hickory	21	0.75

AARVb

Acer saccharum-*Acer rubrum*/*Viburnum acerifolium* (Sugar maple-red maple/maple-leaf viburnum)

Distribution:

Dunn, Chippewa, Eau Claire Counties, especially Natural Subdivision 6e. Most of the type currently in agriculture.

Similar types: ArDe-V

Landform and soils:

This type occurs within the outwash terraces (valley trains) of major rivers in this region (Chippewa, Red, Eau Claire and probably Black river) where a layer of loam or silt loam covers sand and gravel. It may also occur on moraines with similar texture. The type is classified as **dry-mesic/medium nutrient**.

Vegetation:

Common forest cover types:

Stands that were sampled (only 7) are dominated by *red* and *white oak*, but *red maple* and *sugar maple* are usually present.

Shrub and small tree layer: Most characteristic is *maple-leaf viburnum*. Others, in order of decreasing aver-

age coverage are *hazel*, *black cherry*, *choke cherry*, *fly honeysuckle* and *bush honeysuckle*. However, *ironwood* and *red maple* often dominate this layer.

Ground flora characteristics:

Species of dry-mesic habitats prevail, e.g. *maple-leaf viburnum*, *hazel*, *big-leaf aster*, *wild sarsaparilla*, *pointed-leaf tick trefoil* and *bracken fern*. Presence of *blueberry* (constancy 72%) is also noteworthy because it underscores the trend toward a drier site type.

Disturbance and succession: Maps of presettlement vegetation show a complex pattern in the area where this type was identified. Oak, pine, prairie as well as maple-basswood communities were found. Clearly fire regime played a major role. In the absence of fire oak stands readily succeed to either red or sugar maple. It appears that *sugar maple* is not out-competing red maple on this type, therefore both species are included in the habitat type name.

AARVb

Understory species in order of decreasing constancy, with average coverage.

Scientific name	Common name	Constancy	Coverage
		%	%
Herbs			
Grasses spp.	Grasses	100	2.93
Aster macrophyllus	Large-leaved aster	100	1.63
Desmodium glutinosum	Pointed-leaved tick trefoil	85	0.43
Polygonatum pubescens	Hairy solomon's seal	85	0.18
Aralia nudicaulis	Wild sarsaparilla	85	2.60
Osmunda claytoniana	Interrupted fern	71	1.26
Amphicarpa bracteata	Hog peanut	71	1.56
Uvularia sessilifolia	Sessile-leaved bellwort	71	0.60
Trillium spp.	Trilliums	71	0.60
Pteridium aquilinum	Braken fern	71	0.40
Anemone quinquefolia	Wood anemone	57	0.35
Dryopteris spinulosa	Spinulose shield fern	57	1.55
Thalictrum dioicum	Early meadow rue	57	0.10
Hepatica americana	Round-lobed hepatica	57	0.47
Hepatica acutiloba	Sharp-lobed hepatica	42	0.43
Maianthemum canadense	Wild lily-of-the-valley	42	0.10
Helianthus spp.	Sunflowers	42	0.27
Viola pennsylvanica	Smooth yellow violet	42	0.27
Galium boreale	Northern bedstraw	42	0.60
Geranium maculatum	Wild geranium	42	1.40
Sanicula marilandica	Black snakeroot	28	0.35
Lysimachia quadrifolia	Whorled loosestrife	28	0.10
Solidago spp.	Goldenrods	28	0.35
Smilax tamnoides	Bristly greenbrier	28	0.35
Fragaria vesca	Wood strawberry	28	0.60
Osmorhiza claytoni	Sweet cicely	28	0.35
Circaea quadrisulcata	Enchanter's nightshade	28	0.35
Smilacina racemosa	False solomon's seal	28	0.35
Streptopus roseus	Rosey twisted stalk	28	0.35
Galium triflorum	Sweet-scented bedstraw	28	0.10
Trientalis borealis	Starflower	28	0.35
Shrubs			
Viburnum acerifolium	Maple-leaved viburnum	100	3.27
Ribes spp.	Gooseberries	71	0.30
Corylus cornuta	Beaked hazelnut	71	3.76
Prunus virginiana	Chokecherry	71	0.40
Vaccinium angust.	Low sweet blueberry	71	0.30
Diervilla lonicera	Bush honeysuckle	57	0.35
Corylus americana	Hazel-nut	57	1.67
Lonicera canadensis	American fly honeysuckle	57	0.95
Cornus alternifolia	Alternate-leaved dogwood	42	5.23
Rubus spp.	Blackberries/raspberries	28	1.80
Viburnum rafinesquianum	Downy arrowwood	28	1.55
Hamamelis virginiana	Witch hazel	28	0.10
Tree Seedlings			
Quercus rubra	Northern red oak	100	0.31
Prunus serotina	Black cherry	85	0.83
Acer rubrum	Red maple	85	1.32
Acer saccharum	Sugar maple	57	2.42
Tilia americana	Basswood	57	0.82
Ostrya virginiana	Ironwood	57	2.28
Fraxinus nigra	Black ash	42	0.43
Populus grandidentata	Bigtooth aspen	42	0.43
Quercus alba	White oak	42	0.10

ATiCa-La and ATiSa-De

Acer-Tilia/Caulophyllum habitat type, *Laportea* variant
Acer-Tilia/Sanguinaria habitat type, *Desmodium* variant

(Sugar maple-Basswood/Blue cohosh, Wood nettle variant and
Sugar maple-Basswood/Bloodroot,
Pointed-leaf tick-trefoil variant)

Distribution:

Primarily in Pierce county and adjacent portions of St Croix, Dunn and Pepin counties. Natural Subdivision 6a. Most of the area of these habitat types has been converted to agriculture. Woodlands occur primarily in drainages and on slopes.

Similar habitat types: ACaCi
(Region 2, northern)

Landform and soils:

Silt loam over acid till (ground moraine). **ATiCa-La** is found most often on gentle slopes, flats or broad summits with deep soils; aspect is predominantly north and east. **ATiSa-De** is usually on steeper slopes and S-W aspect. Silt cap often thinner with clayey subsoil. **Mesic/very rich** sites.

Vegetation:

Common forest cover types: Both types are usually dominated by *sugar maple* and *basswood*. *Red oak* or *bitternut hickory* are common associates. *White oak*, *ironwood (Ostrya)* or *red maple* are more common on the **ATiSa-De**. *White ash* is rare in comparison with mesic forests in other regions.

Shrub and small tree layer: Shrub layer is not well developed on either of these two variants when tree canopy is closed. Most common are *gooseberry*, *choke cherry* and *alter-*

nate-leaf dogwood. *Ironwood* is often abundant on **ATiSa-De**.

Ground flora characteristics: The mesic-rich site species group is well represented in both variants although total herb coverage tends to be low. Most characteristic are *bloodroot*, *blue cohosh*, *sharp-lobed hepatica*, *wild ginger*, and *trillium*. *Wood nettle* was found on about half of the study stands on the **ATiCa-La**, but coverages were high (10-20%). The following group is much better represented on the **ATiSa-De**: *pointed-leaf tick trefoil*, *wild geranium*, *big-leaf aster*, *black snakeroot*, *green briar* and *zig-zag goldenrod*.

Disturbance and succession:

In presettlement time the area described here was dominated by *sugar maple basswood* forest and was surrounded by oak openings, oak savanna or prairie. There are no consistent soil differences among these presettlement vegetation types to account for the variation. Fire history appears to be the primary cause. *Maple-basswood* forests appear to be stable on these habitat types. Stands dominated by any other species, especially oaks, are also being replaced by maple-basswood wherever adequate seed sources exist.

ATiCa-La

Understory species in order of decreasing constancy, with average coverage.

Scientific name	Common name	Constancy	Coverage
		%	%
Herbs			
<i>Osmorhiza claytoni</i>	Sweet cicely	79	0.45
<i>Trillium</i> spp.	Trilliums	79	0.43
<i>Sanguinaria canadensis</i>	Bloodroot	79	0.36
<i>Caulophyllum thalictroides</i>	Blue cohosh	72	0.61
<i>Thalictrum dioicum</i>	Early meadow rue	65	1.25
<i>Parthenocissus quinquefolia</i>	Virginia creeper	62	1.13
<i>Viola pensylvanica</i>	Smooth yellow violet	62	0.57
<i>Hepatica acutiloba</i>	Sharp-lobed hepatica	58	0.76
<i>Circaea quadrisulcata</i>	Enchanter's nightshade	58	1.78
<i>Amphicarpa bracteata</i>	Hog peanut	55	0.41
<i>Solidago flexicaulis</i>	Zigzag goldenrod	55	0.62
<i>Laportea canadensis</i>	Wood nettle	55	19.94
<i>Asarum canadense</i>	Wild ginger	55	3.12
<i>Dryopteris spinulosa</i>	Spinulose shield fern	51	1.46
<i>Arisaema atrorubens</i>	Jack-in-the-pulpit	48	0.28
<i>Sanicula marilandica</i>	Black snakeroot	48	1.76
Grasses spp.	Grasses	48	1.69
<i>Uvularia grandiflora</i>	Large-flowered bellwort	48	0.56
<i>Actaea</i> spp.	Baneberries	48	0.90
<i>Ranunculus hispidus</i>	Hispid buttercup	48	0.39
<i>Adiantum pedatum</i>	Maidenhair fern	44	3.07
<i>Mitella diphylla</i>	Miterwort	41	0.43
<i>Botrychium virginianum</i>	Rattlesnake fern	41	0.14
<i>Smilax herbacea</i>	Carrion flower	37	0.19
<i>Smilacina racemosa</i>	False solomon's seal	34	0.64
<i>Allium tricoccum</i>	Wild leek	34	0.35
<i>Ranunculus</i> spp.	Buttercups	31	1.20
<i>Anemone quinquefolia</i>	Wood anemone	27	0.29
<i>Polygonatum pubescens</i>	Hairy solomon's seal	27	0.22
<i>Viola</i> spp.	Violets	27	0.47
<i>Galium triflorum</i>	Sweet-scented bedstraw	27	0.16
<i>Uvularia sessilifolia</i>	Sessile-leaved bellwort	27	0.29
<i>Geranium maculatum</i>	Wild geranium	24	3.27
Shrubs			
<i>Ribes</i> spp.	Gooseberries	75	2.32
<i>Prunus virginiana</i>	Chokecherry	65	1.81
<i>Cornus alternifolia</i>	Alternate-leaved dogwood	51	1.65
<i>Viburnum lentago</i>	Nannyberry	20	0.35
Tree Seedlings			
<i>Carya cordiformis</i>	Bitternut hickory	93	0.86
<i>Acer saccharum</i>	Sugar maple	82	3.98
<i>Ulmus americana</i>	American elm	72	1.50
<i>Tilia americana</i>	Basswood	37	0.98
<i>Quercus rubra</i>	Northern red oak	20	0.10

ATiSa-De

Understory species in order of decreasing constancy, with average coverage.

Scientific name	Common name	Constancy %	Coverage %
Herbs			
<i>Solidago flexicaulis</i>	Zigzag goldenrod	92	1.70
<i>Sanguinaria canadensis</i>	Bloodroot	92	0.48
<i>Sanicula marilandica</i>	Black snakeroot	92	1.30
<i>Osmorhiza claytoni</i>	Sweet cicely	85	0.49
<i>Thalictrum dioicum</i>	Early meadow rue	85	1.00
<i>Uvularia grandiflora</i>	Large-flowered bellwort	82	0.38
<i>Geranium maculatum</i>	Wild geranium	78	1.14
<i>Desmodium glutinosum</i>	Pointed-leaved tick trefoil	78	1.20
<i>Smilax herbacea</i>	Carrion flower	78	0.28
<i>Adiantum pedatum</i>	Maidenhair fern	75	1.03
<i>Mitella diphylla</i>	Miterwort	75	0.78
<i>Asarum canadense</i>	Wild ginger	75	3.01
<i>Amphicarpa bracteata</i>	Hog peanut	71	2.08
<i>Trillium</i> spp.	Trilliums	71	0.32
<i>Aster macrophyllus</i>	Large-leaved aster	67	3.88
<i>Hepatica acutiloba</i>	Sharp-lobed hepatica	64	0.76
<i>Circaea quadrisulcata</i>	Enchanter's nightshade	60	0.45
<i>Caulophyllum thalictroides</i>	Blue cohosh	57	0.26
Grasses spp.	Grasses	57	2.82
<i>Smilacina racemosa</i>	False solomon's seal	57	0.80
<i>Dryopteris spinulosa</i>	Spinulose shield fern	53	3.31
<i>Ranunculus hispidus</i>	Hispid buttercup	53	0.50
<i>Parthenocissus quinquefolia</i>	Virginia creeper	50	1.31
<i>Solidago</i> spp.	Goldenrods	50	0.35
<i>Viola pensylvanica</i>	Smooth yellow violet	50	0.49
<i>Actaea</i> spp.	Baneberries	46	0.29
<i>Ranunculus</i> spp.	Buttercups	46	0.18
<i>Galium concinnum</i>	Shining bedstraw	42	0.31
<i>Aralia nudicaulis</i>	Wild sarsaparilla	42	2.60
<i>Anemone quinquefolia</i>	Wood anemone	39	0.33
<i>Botrychium virginianum</i>	Rattlesnake fern	39	0.19
<i>Helianthus</i> spp.	Sunflowers	39	0.45
<i>Phryma leptostachya</i>	Lopseed	35	0.20
<i>Osmunda claytoniana</i>	Interrupted fern	32	6.24
<i>Polygonatum pubescens</i>	Hairy solomon's seal	28	0.29
<i>Vitis riparia</i>	Riverbank grape	28	0.46
<i>Athyrium filix-femina</i>	Lady fern	25	0.73
<i>Arisaema atrorubens</i>	Jack-in-the-pulpit	25	0.10
<i>Uvularia sessilifolia</i>	Sessile-leaved bellwort	21	0.18
<i>Rhus radicans</i>	Poison ivy	21	0.27
<i>Fragaria vesca</i>	Wood strawberry	21	0.35
<i>Polemonium reptans</i>	Greek valerian	21	0.35
<i>Prenanthes alba</i>	White lettuce	21	0.10

Scientific name	Common name	Constancy %	Coverage %
Shrubs			
Ribes spp.	Gooseberries	89	1.38
Prunus virginiana	Chokecherry	85	0.85
Cornus alternifolia	Alternate-leaved dogwood	78	1.57
Xanthoxylum americanum	Prickly ash	39	0.59
Rubus spp.	Blackberries/raspberries	32	0.42
Corylus cornuta	Beaked hazelnut	32	1.44
Amelanchier spp.	Juneberry	28	0.41
Viburnum lentago	Nannyberry	28	0.22
Lonicera canadensis	American fly honeysuckle	28	0.29
Corylus americana	Hazel-nut	28	1.25
Viburnum rafinesquianum	Downy arrowwood	21	0.75
Crataegus spp.	Hawthorns	21	1.07
Tree Seedlings			
Acer saccharum	Sugar maple	89	3.82
Quercus rubra	Northern red oak	67	0.28
Ostrya virginiana	Ironwood	67	1.50
Carya cordiformis	Bitternut hickory	67	0.72
Tilia americana	Basswood	60	0.68
Prunus serotina	Black cherry	53	0.30
Ulmus americana	American elm	50	0.62
Fraxinus pennsylvanica	Green ash	25	0.17

Understory Species with Potential Diagnostic Value for Distinguishing among the Habitat Types in Region 6

Numbers represent frequency of occurrence classes: * 10-25%; 1, 26-50%; 2, 51-75%; 3, 76-100%. Letters are coverage classes: A<5%; B 6-15%; C>15%.

Scientific Name	Common Name	PVGy		PVRh	ArDe-V			ArCi	ATISa-De	
		PVCr	PVHa	AARVb	ArCi-Ph	ATICa-La				
Herbs										
<i>Euphorbia corollata</i>	Flowering spurge	1 A	1 A							
<i>Cliantonia borealis</i>	Yellow beadlilly			1 A						
<i>Coptis groenlandica</i>	Goldthread			1 A						
<i>Cornus canadensis</i>	Bunchberry			1 A	*					
<i>Osmunda cinnamomea</i>	Cinnamon fern			2 C						*
<i>Lycopodium obscurum</i>	Ground-pine			2 A	1 A		*	*		
<i>Mitchella repens</i>	Partridgeberry		*	2 A	1 A		*			
<i>Rubus hispida</i>	Swamp dewberry			3 A	1 A					
<i>Goodyera pubescens</i>	Downy rattlesnake plantain	*	*		*	1 A	*	*	*	
<i>Gaultheria procumbens</i>	Wintergreen	2 A	*	2 A	3 A		*			
<i>Apocynum androsaemifolium</i>	Spreading dogbane	2 A	2 A	1 A	1 A	1 A			1 A	
<i>Trientalis borealis</i>	Starflower	1 A	1 A	3 A	2 A	*	1 A	1 A	*	
<i>Lysimachia quadrifolia</i>	Whorled loosestrife	2 A	1 A	*	2 A	2 A	1 A			
<i>Pteridium aquilinum</i>	Braken fern	3 C	3 B	2 B	3 B	3 B	2 A	2 A	1 A	*
<i>Maianthemum canadense</i>	Wild lily-of-the-valley	2 A	3 A	3 A	2 A	1 A	1 A	2 A	1 A	
<i>Uvularia sessilifolia</i>	Sessile-leaved bellwort	2 A	2 A	3 A	3 A	2 A	2 A	2 A	2 A	* 1 A
<i>Aralia nudicaulis</i>	Wild sarsaparilla	1 A	3 A	3 A	3 A	3 A	3 A	*	2 A	1 A
<i>Aster macrophyllus</i>	Large-leaved aster	1 A	1 A	1 A	2 A	2 A	3 A	1 A	1 A	2 A
<i>Smilacina racemosa</i>	False solomon's seal	1 A	3 A	*	*	2 A	1 A	1 A	1 A	2 A
<i>Anemone quinquefolia</i>	Wood anemone	*	*	1 A	*	1 A	2 A	1 A	*	1 A
<i>Streptopus roseus</i>	Rosey twisted stalk	*	*		*	*	1 A		*	*
<i>Fragaria vesca</i>	Wood strawberry	*	*			1 A	1 A	1 A	*	*
<i>Potentilla simplex</i>	Common cinquefoil	*	*		*	1 A	*		1 A	
<i>Hepatica americana</i>	Round-lobed hepatica		*			1 A	2 A			
<i>Smilax tannoides</i>	Bristly greenbrier		1 A	*	1 A	*	1 A	*	*	*
<i>Pyrola</i> spp.	Pyrolas		1 A	*	*	1 A	*	*	1 A	
<i>Vitis riparia</i>	Riverbank grape		1 A			1 A		1 A	2 A	1 A
<i>Lathyrus ochroleucus</i>	Pale vetchling		1 A			2 A			*	
<i>Osmunda claytoniana</i>	Interrupted fern			1 A	1 A	1 A	2 A		1 A	1 B
<i>Rhus radicans</i>	Poison ivy		*			*		1 A	1 A	*
<i>Athyrium filix-femina</i>	Lady fern					*			1 A	*
<i>Aralia racemosa</i>	Spikenard					*			1 A	*
<i>Gallium boreale</i>	Northern bedstraw		*			*	1 A	1 A	1 A	
<i>Desmodium nudiflorum</i>	Naked-flowered tick trefoil					2 A			1 A	
<i>Desmodium glutinosum</i>	Pointed-leaved tick trefoil		*			3 A	3 A	2 A	3 A	3 A
<i>Geranium maculatum</i>	Wild geranium		*			2 A	1 A	2 A	3 A	3 A
<i>Smilax herbacea</i>	Carrion flower					1 A		1 A	2 A	3 A
<i>Polygonatum pubescens</i>	Hairy solomon's seal		*			1 A	3 A	*	*	1 A
<i>Parthenocissus quinquefolia</i>	Virginia creeper		2 A	*		2 A	*	3 A	3 A	1 A
<i>Dryopteris spinulosa</i>	Spinulose shield fern		1 A	*		1 A	2 A	1 A	2 A	2 A
<i>Amphicarpa braceata</i>	Hog peanut					2 A	2 A	2 A	3 A	2 A
<i>Thalictrum dioicum</i>	Early meadow rue					*	2 A	*	1 A	3 A
<i>Circaea quadrifida</i>	Enchanter's nightshade					*	1 A	3 A	3 A	2 A

Scientific Name	Common Name	PVGy	PVRh	ArDe-V		ArCi	ATISa-De		
		PVCr	PVHa	AARvb	ArCi-Ph	ATICa-La			
<i>Galium triflorum</i>	Sweet-scented bedstraw	*		1A	1A	1A	3A	1A	
<i>Osmorhiza claytoni</i>	Sweet cicely			2A	1A	2A	3A	3A	
<i>Uvularia grandiflora</i>	Large-flowered bellwort			*	*	*	2A	3A	
<i>Sanicula marilandica</i>	Black snakeroot			*	1A	*	2A	3A	
<i>Phryma leptostachya</i>	Lopseed			1A			3A	1A	
<i>Actaea</i> spp.	Baneberries					1A	1A	1A	
<i>Arisaema atrorubens</i>	Jack-in-the-pulpit						1A	*	
<i>Adiantum pedatum</i>	Maidenhair fern						1A	2A	
<i>Botrychium virginianum</i>	Rattlesnake fern						1A	1A	
<i>Viola pensylvanica</i>	Smooth yellow violet					1A	*	1A	
<i>Ranunculus</i> spp.	Buttercups					*	*	1A	
<i>Galium concinnum</i>	Shining bedstraw			*				1A	
<i>Solidago flexicaulis</i>	Zigzag goldenrod					*		3A	
<i>Trillium</i> spp.	Trilliums					2A		2A	
<i>Caulophyllum thalictroides</i>	Blue cohosh					*		2A	
<i>Hepatica acutiloba</i>	Sharp-lobed hepatica					1A		2A	
<i>Galium asprellum</i>	Cleavers						*	*	
<i>Ranunculus hispidus</i>	Hispid buttercup							2A	
<i>Mitella diphylla</i>	Miterwort							2A	
<i>Asarum canadense</i>	Wild ginger							2A	
<i>Sanguinaria canadensis</i>	Bloodroot							3A	
<i>Geum laciniatum</i>	Rough avens						1A		
<i>Urtica procera</i>	Tall nettle						1A		
<i>Agrimonia gryposepala</i>	Agrimony						1A		
<i>Allium tricoccum</i>	Wild leek							*	
<i>Laportea canadensis</i>	Wood nettle							1A	
								2C	
Shrubs									
<i>Amorpha canescens</i>	Lead plant	*	1A						
<i>Gaylussacia baccata</i>	Black huckleberry	3B	1A	2B	2A	1A			
<i>Vaccinium angustifolium</i>	Low sweet blueberry	3A	3A	3A	3A	3A	2A	1A	*
<i>Ilex verticillata</i>	Winterberry	*	2A	3A	1A	*	*	1A	*
<i>Amelanchier</i> spp.	Juneberry	3A	3A	3A	3A	3A	*	2A	2A
<i>Diervilla lonicera</i>	Bush honeysuckle	1A	1A		2A	2A	2A	*	1A
<i>Corylus cornuta</i>	Beaked hazelnut	*	1A	*	1A	*	2A	*	1A
<i>Corylus americana</i>	Hazel-nut	1A	2A	*	*	3B	2A	2A	1A
<i>Viburnum acerifolium</i>	Maple-leaved viburnum	*	*		2A	1A	3A	*	*
<i>Rubus</i> spp.	Blackberries/raspberries	2A	3A	1A	2A	3A	1A	3A	3A
<i>Prunus virginiana</i>	Chokecherry	*	3A			3A	2A	3A	2A
<i>Ribes</i> spp.	Gooseberries		*		*	2A	2A	2A	3A
<i>Cornus alternifolia</i>	Dogwood (altlv)		*	*	*	1B	*	*	3A
<i>Viburnum rafinesquianum</i>	Downy arrowwood		*			1A	1A	*	*
<i>Crataegus</i> spp.	Hawthorns		*		1A	1A	*	*	*
<i>Cornus racemosa</i>	Gray dogwood		3A			2A		1A	2A
<i>Hamamelis virginiana</i>	Witch hazel				2A		1A		
<i>Aronia melanocarpa</i>	Black chokeberry			1A	*				
<i>Salix humilis</i>	Prairie willow							1A	
<i>Lonicera canadensis</i>	American fly honeysuckle						2A		1A
<i>Xanthoxylum americanum</i>	Prickly ash		*					1A	*
<i>Viburnum lentago</i>	Nannyberry					*	*	1A	1A
<i>Sambucus canadensis</i>	Common elder							2A	

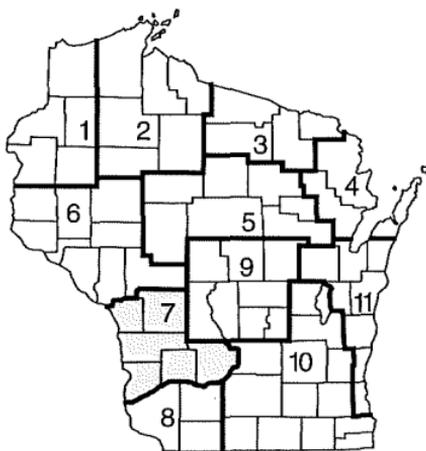
Region 7

Extent, topography, geology and soils

Region 7 represents the central portion of the Driftless Area. It includes LaCrosse, Monroe, Vernon, Crawford, Richland and Sauk counties. All but the northern margin of this region is within the Natural Subdivisions 6a and 6b. Much of this hilly country is highly dissected by river valleys (coulees), with no evidence of glaciation. This region has the longest and steepest slopes of any region in the state. Dolomite is the predominant bedrock occurring near the surface on ridge tops and upper side slopes and sandstone is the predominant rock exposed on the steep valley sides.

The soils of this region are formed partly from the underlying bedrock and partly from a two to four foot thick blanket of windblown silty layer (loess). The surface layer is dominantly silt loam. Typical subsoils are silty clay loam, or clay in areas of dolomitic bedrock, and sandy loam, loamy sand or sand in areas of sandstone bedrock.

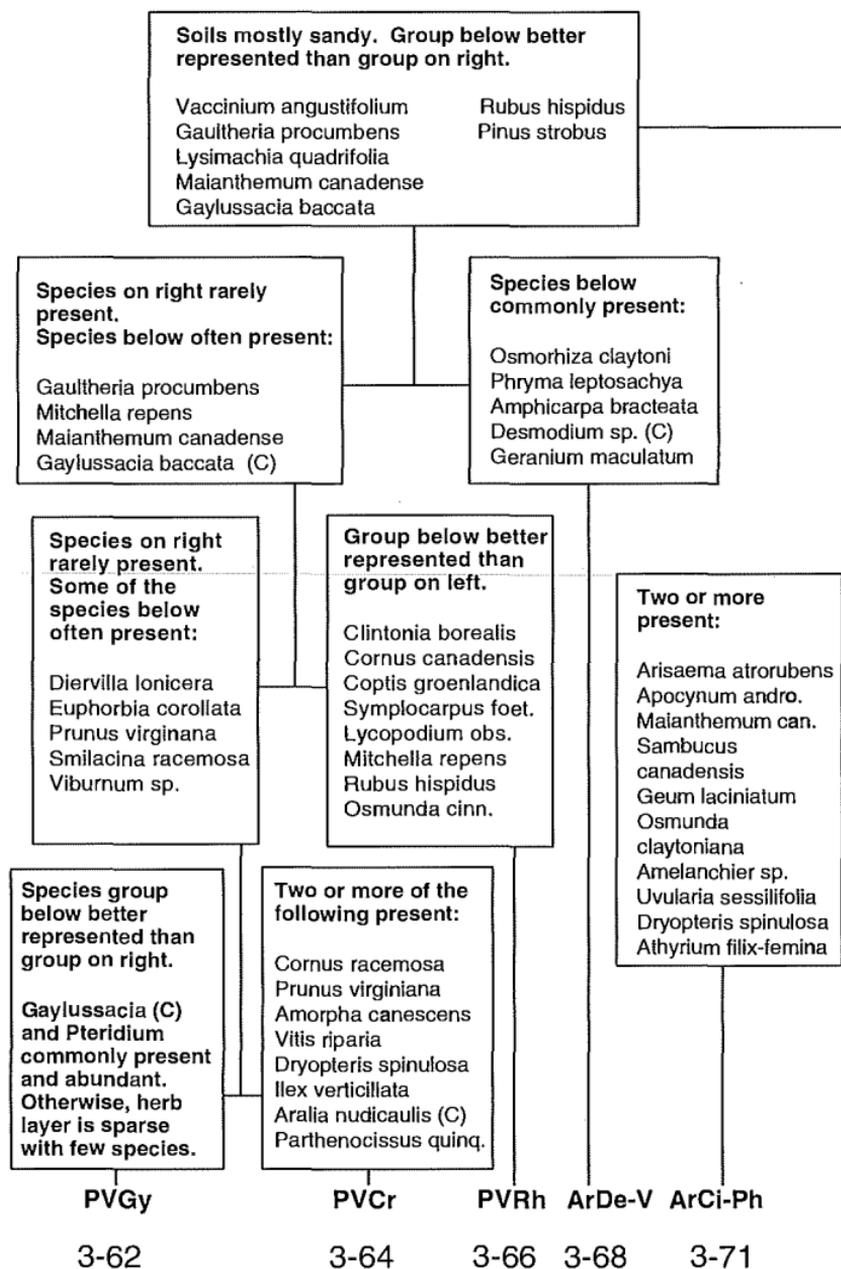
The northern extreme of region 7 extends into Natural Subdivision 6c, which is characterized by rolling terrain with sandstone bedrock and covering of a mixture of leached loess and sandstone residuum. (See region 6 for description of specific soils).



Forest vegetation

As in most areas of southern Wisconsin the climate and soils are suitable for the development of mesic deciduous forests. However, except for the scattered fire-protected landscape positions the presettlement vegetation in southern Wisconsin consisted of prairies, oak savannas, oak openings and oak forests. In great contrast to the general pattern region 7 contained one of the three largest blocks of southern mesic forest found in the state. In this case, the approximately 1000 square mile wedge of land between the Wisconsin and Kickapoo Rivers escaped the fires that maintained savannas in the surrounding areas. The natural subdivision 6a is based entirely on the presettlement presence of sugar maple basswood forest.

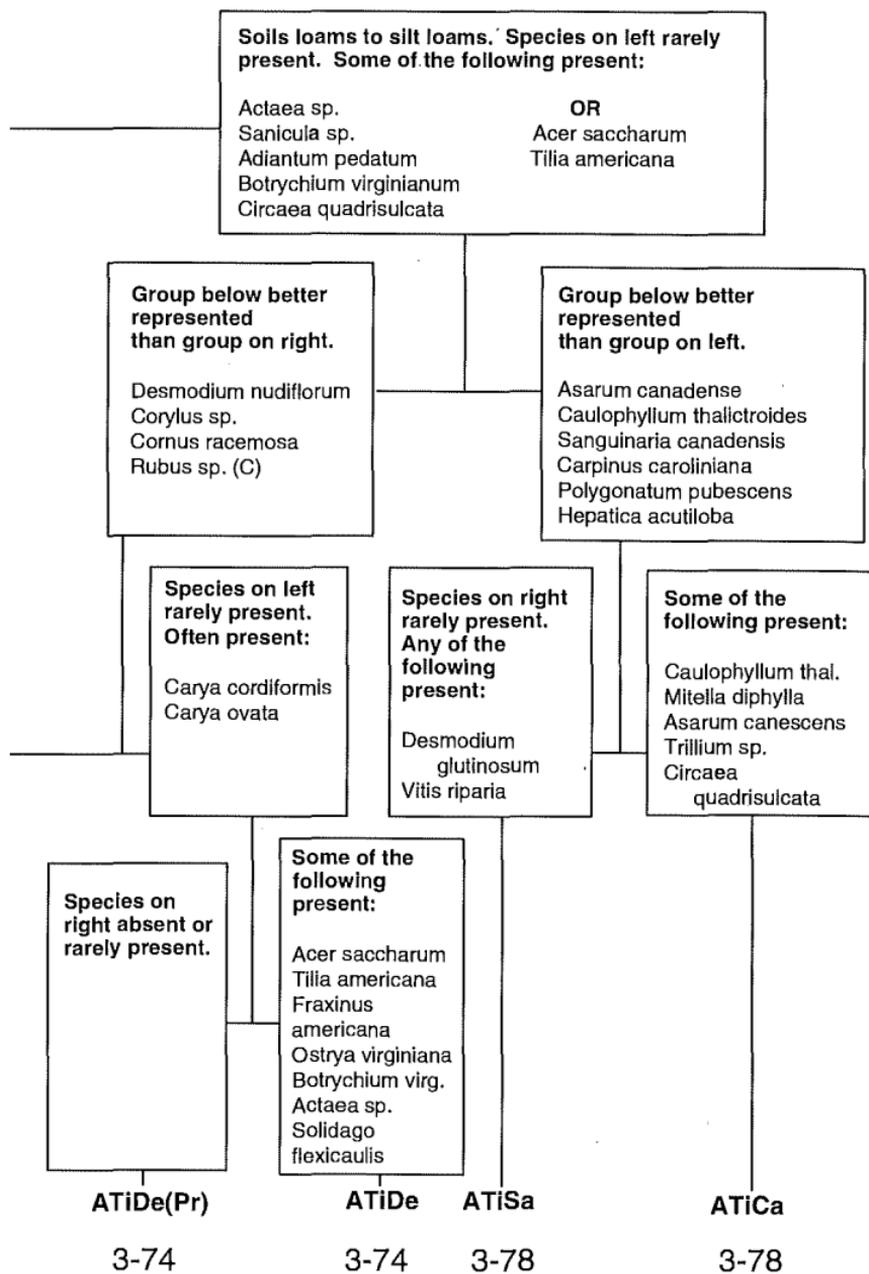
Key to Habitat Types of Region 7 - Scientific Names



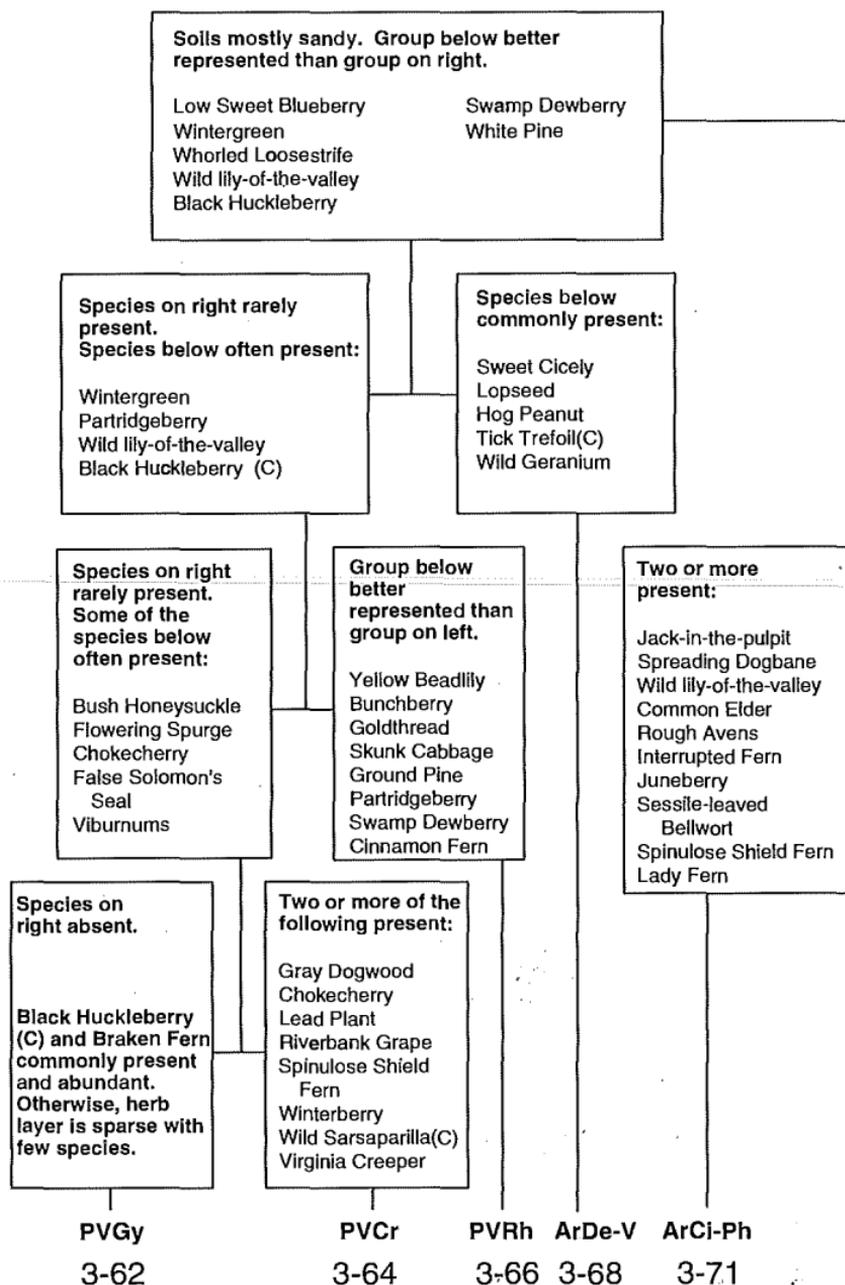
Group below well represented: Several species are found rather than any one being common.

Poorly represented: Usually no more than one species from the group present. Abundance may be low or high.

(C) - Common: >1%



Key to Habitat Types of Region 7 - Common Names



Group below well represented: Several species are found rather than any one being common.

Poorly represented: Usually no more than one species from the group present. Abundance may be low or high.

(C) - Common: >1%

Soils loams to silt loams. Species on left rarely present. Some of the following present:

Baneberries
Snakeroots
Maidenhair Fern
Rattlesnake Fern
Enchanter's Nightshade

OR
Sugar Maple
Basswood

Group below better represented than group on right.

Naked-flowered Tick Trefoil
Hazelnuts
Gray Dogwood
Blackberries/Raspberries (C)

Group below better represented than group on left.

Wild Ginger
Blue Cohosh
Bloodroot
American Hornbeam
Hairy Solomon's Seal
Sharp-lobed Hepatica

Species on left rarely present. Often present:

Bitternut Hickory
Shagbark Hickory

Species on right rarely present. Any of the following present:

Pointed-leaved
Tick Trefoil
Riverbank Grape

Some of the following present:

Blue Cohosh
Miterwort
Wild Ginger
Trilliums
Enchanter's Nightshade

Species on right absent or rarely present.

Some of the following present:

Sugar Maple
Basswood
White Ash
Ironwood
Rattlesnake Fern
Baneberries
Zig-zag Goldenrod

ATiDe(Pr)
3-74

ATiDe
3-74

ATiSa
3-78

ATiCa
3-78

Comparison of Major Floristic Differences Between Closely Related Habitat Types in Region 7

		PVGy	PVCr
Gaylussacia baccata	Black huckleberry	83,7	47,1
Lysimachia quadrifolia	Whorled loosestrife	69	35
Gaultheria procumbens	Wintergreen	55	17
Epigaea repens	Trailing arbutus	23	.
Smilacina racemosa	False solomon's seal	42	88
Aralia nudicaulis	Wild sarsaparilla	48	76
Cornus racemosa	Gray dogwood	7	76
Prunus virginiana	Chokecherry	12	76
Ilex verticillata	Winterberry	21	52
Parthenocissus quinq.	Virginia creeper	5	52
Amorpha canescens	Lead plant	10	35
Smilax tamnoides	Bristly greenbrier	5	35
		PVCr	ArDe-V
Maianthemum canadense	Wild lily-of-the-valley	76	38
Amorpha canescens	Lead plant	35	4
Desmodium glutinosum	Pointed-leaved tick trefoil	11	90
Geranium maculatum	Wild geranium	23	71
Amphicarpa bracteata	Hog peanut	5	61
Osmorhiza claytoni	Sweet cicely	.	57
Desmodium nudiflorum	Naked-flowered tick trefoil	5	52
Phryma leptostachya	Lopseed	.	33
		PVRh	ArDe-V
Trientalis borealis	Starflower	100	14
Ilex verticillata	Winterberry	93	23
Rubus hispidus	Swamp dewberry	87	.
Maianthemum canadense	Wild lily-of-the-valley	81	38
Mitchella repens	Partridgeberry	75	9
Gaylussacia baccata	Black huckleberry	76	47
Gaultheria procumbens	Wintergreen	62	.
Osmunda cinnamomea	Cinnamon fern	62	.
Lycopodium obscurum	Ground-pine	56	.
Cornus canadensis	Bunchberry	50	.
Coptis groenlandica	Goldthread	43	.
Desmodium glutinosum	Pointed-leaved tick trefoil	.	90
Diervilla lonicera	Bush honeysuckle	.	71
Geranium maculatum	Wild geranium	.	71
Smilacina racemosa	False solomon's seal	12	71
Cornus racemosa	Gray dogwood	.	66
Parthenocissus quinq.	Virginia creeper	12	66
Amphicarpa bracteata	Hog peanut	.	61
Osmorhiza claytoni	Sweet cicely	.	57
Desmodium nudiflorum	Naked-flowered tick trefoil	.	52
Viburnum acerifolium	Maple-leaved viburnum	.	38
		ArCi-Ph	ATiDe(Pr)
Circaea quadrisulcata	Enchanter's nightshade	93	63
Dryopteris spinulosa	Spinulose shield fern	65	36
Desmodium nudiflorum	Naked-flowered tick trefoil	45	27
Carya ovata	Shagbark hickory	41	81
Galium concinnum	Shining bedstraw	8	72
Carya cordiformis	Bitternut hickory	21	72
Dioscorea villosa	Wild yam root	10	45

		ArCi-Ph	ATISa
<i>Circaea quadrisulcata</i>	Enchanter's nightshade	93	15
<i>Acer rubrum</i>	Red maple	76	.
<i>Corylus americana</i>	Hazel-nut	73	10
<i>Sambucus canadensis</i>	Common elder	54	.
<i>Amelanchier</i> spp.	Juneberry	54	.
<i>Pteridium aquilinum</i>	Braken fern	36	.
<i>Maianthemum canadense</i>	Wild lily-of-the-valley	34	.
<i>Apocynum androsaemifolium</i>	Spreading dogbane	32	.
<i>Acer saccharum</i>	Sugar maple	8	100
<i>Sanguinaria canadensis</i>	Bloodroot	8	89
<i>Botrychium virginianum</i>	Rattlesnake fern	41	73
<i>Solidago flexicaulis</i>	Zigzag goldenrod	6	68
<i>Viburnum acerifolium</i>	Maple-leaved viburnum	19	47

		ArCi-Ph	ATICa
<i>Geranium maculatum</i>	Wild geranium	91	64
<i>Desmodium glutinosum</i>	Pointed-leaved tick trefoil	91	35
<i>Rubus</i> spp.	Blackberries/raspberries	85	21
<i>Corylus americana</i>	Hazel-nut	73	.
<i>Cornus racemosa</i>	Gray dogwood	69	7
<i>Desmodium nudiflorum</i>	Naked-flowered tick trefoil	45	.
<i>Sanguinaria canadensis</i>	Bloodroot	8	96
<i>Solidago flexicaulis</i>	Zigzag goldenrod	6	82
<i>Adiantum pedatum</i>	Maidenhair fern	30	71
<i>Polygonatum pubescens</i>	Hairy solomon's seal	17	71
<i>Actaea</i> spp.	Baneberries	32	60
<i>Arisaema atrorubens</i>	Jack-in-the-pulpit	32	60
<i>Caulophyllum thal.</i>	Blue cohosh	6	64
<i>Cornus alternifolia</i>	Alternate-leaved dogwood	15	64
<i>Trillium</i> spp.	Trilliums	6	57
<i>Viola pensylvanica</i>	Smooth yellow violet	2	50
<i>Asarum canadense</i>	Wild ginger	2	39
<i>Hepatica acutiloba</i>	Sharp-lobed hepatica	.	39
<i>Mitella diphylla</i>	Miterwort	.	35

		ATIDe	ATIDe(Pr)
<i>Tilia americana</i>	Basswood	81	18
<i>Botrychium virginianum</i>	Rattlesnake fern	77	36
<i>Fraxinus americana</i>	White ash	66	9
<i>Xanthoxylum americanum</i>	Prickly ash	62	27
<i>Desmodium nudiflorum</i>	Naked-flowered tick trefoil	62	27
<i>Acer saccharum</i>	Sugar maple	55	.
<i>Adiantum pedatum</i>	Maidenhair fern	55	27
<i>Actaea</i> spp.	Baneberries	40	9
<i>Prunus serotina</i>	Black cherry	51	100
<i>Rubus</i> spp.	Blackberries/raspberries	48	100
<i>Ribes</i> spp.	Gooseberries	74	90
<i>Smilacina racemosa</i>	False solomon's seal	29	63
<i>Corylus americana</i>	Hazel-nut	29	63
<i>Circaea quadrisulcata</i>	Enchanter's nightshade	29	63
<i>Agrimonia gryposepala</i>	Agrimony	7	54
<i>Pteridium aquilinum</i>	Braken fern	11	45

continued...

...continued

		ATiDe	ATiSa
Desmodium glutinosum	Pointed-leaved tick trefoil	96	68
Parthenocissus quinq.	Virginia creeper	81	47
Desmodium nudiflorum	Naked-flowered tick trefoil	62	10
Actaea spp.	Baneberries	40	15
Lysimachia quadrifolia	Whorled loosestrife	25	.
Sanguinaria canadensis	Bloodroot	29	89
Polygonatum pubescens	Hairy solomon's seal	7	63

		ATiCa	ATiSa
Circaea quadrisulcata	Enchanter's nightshade	82	15
Caulophyllum thal.	Blue cohosh	64	21
Cornus alternifolia	Alternate-leaved dogwood	64	26
Arisaema atrorubens	Jack-in-the-pulpit	60	36
Actaea spp.	Baneberries	60	15
Trillium spp.	Trilliums	57	10
Viola pensylvanica	Smooth yellow violet	50	15
Hepatica acutiloba	Sharp-lobed hepatica	39	10
Asarum canadense	Wild ginger	40	15
Desmodium glutinosum	Pointed-leaved tick trefoil	35	68
Ostrya virginiana	Ironwood	39	57
Vitis riparia	Riverbank grape	21	57
Carya ovata	Shagbark hickory	7	47

		PVGy	PVRh
Apocynum andro.	Spreading dogbane	75	31
Rosa spp.	Roses	71	.
Lysimachia quadrifolia	Whorled loosestrife	69	18
Diervilla lonicera	Bush honeysuckle	44	.
Trientalis borealis	Starflower	41	100
Euphorbia corollata	Flowering spurge	35	.
Ilex verticillata	Winterberry	21	93
Rubus hispidus	Swamp dewberry	3	87
Mitchella repens	Partridgeberry	7	75
Osmunda cinnamomea	Cinnamon fern	.	62
Lycopodium obscurum	Ground-pine	7	56
Cornus canadensis	Bunchberry	.	50
Coptis groenlandica	Goldthread	.	43
Clintonia borealis	Yellow beadlily	1	37
Osmunda claytoniana	Interrupted fern	1	31

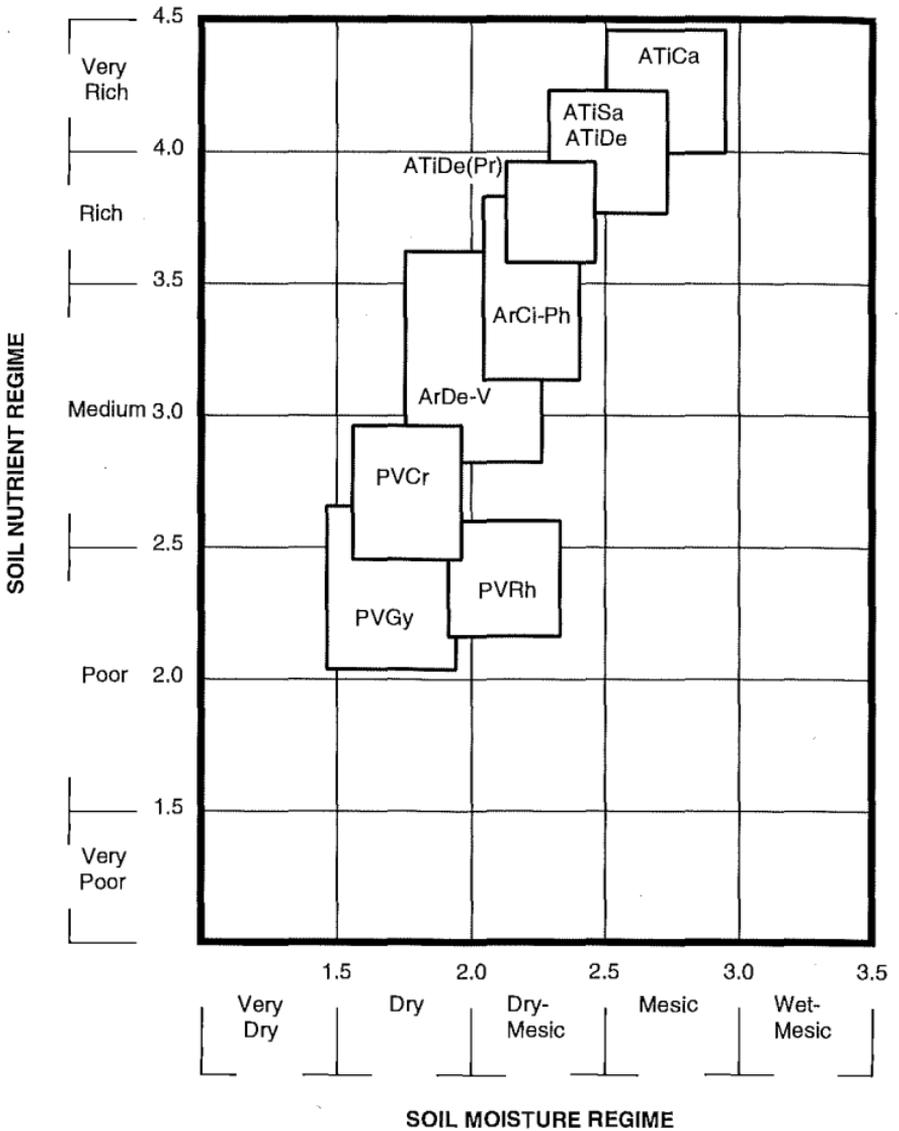
		PVCr	PVRh
<i>Smilacina racemosa</i>	False solomon's seal	88	12
<i>Cornus racemosa</i>	Gray dogwood	76	.
<i>Prunus virginiana</i>	Chokecherry	76	6
<i>Corylus americana</i>	Hazel-nut	64	25
<i>Rosa</i> spp.	Roses	58	.
<i>Parthenocissus quinq.</i>	Virginia creeper	52	12
<i>Diervilla lonicera</i>	Bush honeysuckle	47	.
<i>Trientalis borealis</i>	Starflower	47	100
<i>Rubus hispidus</i>	Swamp dewberry	5	87
<i>Gaylussacia baccata</i>	Black huckleberry	47,1	75,7
<i>Mitchella repens</i>	Partridgeberry	17	75
<i>Gaultheria procumbens</i>	Wintergreen	17	62
<i>Osmunda cinnamomea</i>	Cinnamon fern	.	62
<i>Lycopodium obscurum</i>	Ground-pine	.	56
<i>Cornus canadensis</i>	Bunchberry	.	50
<i>Coptis groenlandica</i>	Goldthread	.	43
<i>Clintonia borealis</i>	Yellow beadlilly	.	37
<i>Osmunda claytoniana</i>	Interrupted fern	.	31
<i>Aronia melanocarpa</i>	Black chokeberry	5	31
		ArDe-V	ArCi-Ph
<i>Vaccinium angust.</i>	Low sweet blueberry	85	13
<i>Pteridium aquilinum</i>	Braken fern	85,6	36,1
<i>Lathyrus ochroleucus</i>	Pale vetchling	61	23
<i>Gaylussacia baccata</i>	Black huckleberry	47	.
<i>Osmorhiza claytoni</i>	Sweet cicely	57	93
<i>Circaea quadrisulcata</i>	Enchanter's nightshade	23	93
<i>Phryma leptostachya</i>	Lopseed	33	82
<i>Sambucus canadensis</i>	Common elder	9	54
		ArCi-Ph	ATIDe
<i>Circaea quadrisulcata</i>	Enchanter's nightshade	93	29
<i>Osmorhiza claytoni</i>	Sweet cicely	93	59
<i>Gallium triflorum</i>	Sweet-scented bedstraw	76	3
<i>Sambucus canadensis</i>	Common elder	54	.
<i>Amelanchier</i> spp.	Juneberry	54	7
<i>Pyrola</i> spp.	Pyrolas	41	3
<i>Diervilla lonicera</i>	Bush honeysuckle	36	.
<i>Athyrium filix-femina</i>	Lady fern	34	3
<i>Maianthemum canadense</i>	Wild lily-of-the-valley	34	.
<i>Xanthoxylum americanum</i>	Prickly ash	10	62
<i>Solidago flexicaulis</i>	Zig-zag goldenrod	6	48

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		ArDe-V	ATiDe
<i>Acer rubrum</i>	Red maple	95	11
<i>Vaccinium angust.</i>	Low sweet blueberry	85	3
<i>Pteridium aquilinum</i>	Braken fern	86,6	11.1
<i>Amelanchier</i> spp.	Juneberry	85,6	7
<i>Corylus americana</i>	Hazel-nut	80	29
<i>Smilacina racemosa</i>	False solomon's seal	71	29
<i>Diervilla lonicera</i>	Bush honeysuckle	71	.
<i>Lathyrus ochroleucus</i>	Pale vetchling	61	.
<i>Uvularia sessilifolia</i>	Sessile-leaved bellwort	57	18
<i>Gaylussacia baccata</i>	Black huckleberry	47	.
<i>Phryma leptostachya</i>	Lopseed	33	88
<i>Sanicula marilandica</i>	Black snakeroot	23	85
<i>Vitis riparia</i>	Riverbank grape	28	66
<i>Uvularia grandiflora</i>	Large-flowered bellwort	23	66
<i>Adiantum pedatum</i>	Maidenhair fern	9	55
<i>Solidago flexicaulis</i>	Zigzag goldenrod	.	48
<i>Actaea</i> spp.	Baneberries	9	40
<i>Botrychium virginianum</i>	Rattlesnake fern	4	77
		ATiDe(Pr)	ATiSa
<i>Ribes</i> spp.	Gooseberries	90,12	78,1
<i>Corylus americana</i>	Hazel-nut	63	10
<i>Circaea quadrisulcata</i>	Enchanter's nightshade	63	15
<i>Helianthus</i> spp.	Sunflowers	54	.
<i>Agrimonia gryposepala</i>	Agrimony	54	.
<i>Sanguinaria canadensis</i>	Bloodroot	9	89
<i>Adiantum pedatum</i>	Maidenhair fern	27	68
<i>Solidago flexicaulis</i>	Zigzag goldenrod	.	68
<i>Polygonatum pubescens</i>	Hairy solomon's seal	.	63
<i>Ostrya virginiana</i>	Ironwood	9	57
<i>Thalictrum dioicum</i>	Early meadow rue	9	57
<i>Viburnum acerifolium</i>	Maple-leaved viburnum	9	47
		ATiDe(Pr)	ATiCa
<i>Desmodium glutinosum</i>	Pointed-leaved tick trefoil	100	35
<i>Rubus</i> spp.	Blackberries/raspberries	100	21
<i>Carya ovata</i>	Shagbark hickory	81	7
<i>Corylus americana</i>	Hazel-nut	63	.
<i>Cornus racemosa</i>	Gray dogwood	63	7
<i>Pteridium aquilinum</i>	Braken fern	45	.
<i>Acer saccharum</i>	Sugar maple	.	96
<i>Sanguinaria canadensis</i>	Bloodroot	9	96
<i>Solidago flexicaulis</i>	Zigzag goldenrod	.	82
<i>Polygonatum pubescens</i>	Hairy solomon's seal	.	71
<i>Dryopteris spinulosa</i>	Spinulose shield fern	36	71
<i>Adiantum pedatum</i>	Maidenhair fern	27,1	71,4
<i>Cornus alternifolia</i>	Alternate-leaved dogwood	18	64
<i>Caulophyllum thalictroides</i>	Blue cohosh	9	64
<i>Actaea</i> spp.	Baneberries	9	60
<i>Arisaema atrorubens</i>	Jack-in-the-pulpit	9	60
<i>Hepatica acutiloba</i>	Sharp-lobed hepatica	.	39
<i>Asarum canadense</i>	Wild ginger	.	39.8

Relationship of Habitat Types to Soil Moisture and Nutrient Regimes in Region 7



PVGy

Pinus strobus/Vaccinium-Gaylussacia (White pine/Blueberry-Huckleberry)

Distribution:

Most prevalent in Region 6, but also in northern parts of Region 7. Natural subdivision 4a.

Similar Types: PVCr, PVHa

Landform And Soils:

Nearly level sand plains with sandstone buttes. Soil is sand or loamy sand, usually more than 3-4 feet deep. Well to excessively well drained. Representative soils are Tarr and Boone sand and loamy sand. The type is classified as **very dry to dry/poor nutrient**. Typical **PVGy** is found on flats and lower slopes. On steep upper slopes, S-SW aspects and narrow ridges a **xeric sub-type of PVGy** should be recognized. No plants consistently reflect these xeric conditions, but tree growth is strongly limited.

Vegetation:

Common Forest Cover Types: Various mixtures of *pinus* (*jack*, *red*, *white*), *pin oak*, *black oak* and *white oak* occur. Pines exhibit normal growth, but oaks only attain small stature and poor form. *Red maple* is present mostly as saplings. In the literature these communities are usually referred to as pine and oak barrens.

Shrub And Small Tree Layer: This layer is absent or poorly developed except for *huckleberry*. The following species are often present, but with low coverages: *serviceberry*, *black cherry*, *blackberries* and *raspberries*. *Red maple* and *black cherry* are often dominant.

Ground Flora Characteristics: Except for *bracken fern*, herbs are largely absent or sparsely distributed. Most commonly found are: *common milkweed*, *whorled loosestrife* and *wild lily-of-the-valley*. Others, with even lower constancy are *wild sarsaparilla*, *false solomon's seal*, and *starflower*. Because only the most drought and low-nutrient tolerant species occur on the extreme end of this gradient plants cannot be used to further distinguish between "normal" and even more xeric sites. Therefore, when vegetation keys out to **PVGy** on steep upper slopes, S-SW aspects or narrow ridges, the site must be considered as a **xeric sub-type of PVGy** type.

Disturbance And Succession: All tree species occurring on this type are adapted to fire disturbance. In the absence of fire *white pine* appears to be best suited for reproduction in the understory and could be expected to dominate undisturbed stands. It is not yet very abundant in present stands but where seed source is present it shows vigorous development in the seedling and sapling layers. *White oak* also appears to regenerate well enough to remain as a permanent associate. *Red pine*, *jack pine*, and *black oak* would become less common. *Red maple* and *black cherry* are often well represented in the sapling layer but attain only small tree size on this type and can be expected to persist as understory associates.

PVGy

Understory species in order of decreasing constancy, with average coverage.

Scientific name	Common name	Constancy %	Coverage %
Herbs			
<i>Pteridium aquilinum</i>	Braken fern	91	15.71
Sedges spp.	Sedges	85	3.26
<i>Apocynum andro.</i>	Spreading dogbane	75	0.51
<i>Lysimachia quadrifolia</i>	Whorled loosetrife	69	0.56
<i>Maianthemum canadense</i>	Wild lily-of-the-valley	64	0.85
<i>Uvularia sessilifolia</i>	Sessile-leaved bellwort	64	0.50
<i>Gaultheria procumbens</i>	Wintergreen	55	0.58
<i>Aralia nudicaulis</i>	Wild sarsaparilla	48	1.24
Grasses spp.	Grasses	44	1.58
<i>Smilacina racemosa</i>	False solomon's seal	42	0.50
<i>Trientalis borealis</i>	Starflower	41	0.63
<i>Euphorbia corollata</i>	Flowering spurge	35	0.50
<i>Aster macrophyllus</i>	Large-leaved aster	28	0.66
<i>Anemone quinquefolia</i>	Wood anemone	23	0.50
<i>Epigaea repens</i>	Trailing arbutus	23	0.50
<i>Potentilla simplex</i>	Common cinquefoil	21	0.50
<i>Goodyera pubescens</i>	Downy rattlesnake plantain	19	0.50
<i>Aster sagittifolius</i>	Arrow-leaved aster	19	0.50
Shrubs			
<i>Vaccinium angust.</i>	Low sweet blueberry	98	2.87
<i>Amelanchier</i> spp.	Juneberry	87	0.96
<i>Gaylussacia baccata</i>	Black huckleberry	83	7.38
<i>Rosa</i> spp.	Roses	71	0.56
<i>Rubus</i> spp.	Blackberries/raspberries	66	2.09
<i>Diervilla lonicera</i>	Bush honeysuckle	44	0.50
<i>Corylus americana</i>	Hazel-nut	41	1.37
<i>Corylus cornuta</i>	Beaked hazelnut	21	2.75
<i>Ilex verticillata</i>	Winterberry	21	0.50
Tree Seedlings			
<i>Acer rubrum</i>	Red maple	78	1.25
<i>Prunus serotina</i>	Black cherry	67	0.76
<i>Pinus strobus</i>	White pine	67	1.41
<i>Quercus ellipsoidalis</i>	Northern pin oak	66	0.84
<i>Quercus alba</i>	White oak	55	1.69
<i>Populus grandidentata</i>	Bigtooth aspen	30	0.65

PVCr

Pinus strobus/Vaccinium-Cornus racemosa (White pine/Blueberry-Gray dogwood)

Distribution:

Primarily in northern parts of Region 7 and throughout Region 6. Closely associated with Natural Subdivisions 4a and 6c.

Similar types: PVGy, PVHa

Landform and soils:

Rolling to hilly topography with sandstone outcrops. Soils are either thin loam or silt loam over deep sand, or over bedrock. Soil example is Eleva sandy loam. This type is classified as **dry/medium nutrient**.

Vegetation:

Common forest cover types: Mixtures of *white oak*, *black oak*, *pin oak* and *white pine* are most common. *Jack pine* is frequently present. *Red oak* is generally absent. *Red maple* is common and grows better than it does on **PVGy**, but less well than on **ArDe-V**. *Black cherry* is almost always present as saplings, but does not develop well into larger size class.

Shrub and small tree layer: This layer is much better represented on this type than it is on **PVGy**. Most diagnostic in this respect

are *gray dogwood* and *choke cherry*. *Black cherry* is also better represented on **PVCr**. Other important species are *blackberries* and *raspberries*, *hazel* and *Serviceberry*.

Ground flora characteristics:

Herbaceous layer is poorly developed on this type. A few species are better represented on this type than they are on the **PGy** and are useful for identification. These are *wild sarsaparilla*, *true solomon's seal* and *Virginia creeper*.

Disturbance and succession:

All tree species occurring on this type are adapted to fire disturbance. The relative frequency and intensity of fire probably controlled community composition in presettlement time. There is no evidence to suggest that in the absence of fire the same species, with the exception of *jack pine*, could not maintain themselves on this type. *White pine*, because of its much larger stature and longer life span than other species, is presumed to be a potential dominant.

PVCr

Understory species in order of decreasing constancy, with average coverage.

Scientific name	Common name	Constancy %	Coverage %
Herbs			
Sedges spp.	Sedges	100	2.24
Smilacina racemosa	False solomon's seal	88	0.50
Pteridium aquilinum	Braken fern	88	10.63
Maianthemum canadense	Wild lily-of-the-valley	76	0.69
Aralia nudicaulis	Wild sarsaparilla	76	3.69
Uvularia sessilifolia	Sessile-leaved bellwort	58	1.00
Apocynum andro.	Spreading dogbane	58	0.50
Parthenocissus quinq.	Virginia creeper	52	0.78
Aster macrophyllus	Large-leaved aster	47	0.81
Trientalis borealis	Starflower	47	0.50
Lysimachia quadrifolia	Whorled loosetrife	35	0.50
Smilax tamnoides	Bristly greenbrier	35	0.50
Lathyrus ochroleucus	Pale vetchling	29	0.50
Pyrola spp.	Pyrolas	29	0.50
Vitis riparia	Riverbank grape	29	0.50
Dryopteris spinulosa	Spinulose shield fern	29	0.50
Euphorbia corollata	Flowering spurge	29	0.50
Grasses spp.	Grasses	29	0.50
Goodyera pubescens	Downy rattlesnake plantain	23	0.50
Galium triflorum	Sweet-scented bedstraw	23	0.50
Galium boreale	Northern bedstraw	23	0.50
Geranium maculatum	Wild geranium	23	0.50
Smilax herbacea	Carrion flower	23	0.50
Fragaria vesca	Wood strawberry	23	0.50
Shrubs			
Rubus spp.	Blackberries/raspberries	88	2.63
Amelanchier spp.	Juneberry	88	1.33
Vaccinium angust.	Low sweet blueberry	82	1.21
Cornus racemosa	Gray dogwood	76	1.81
Prunus virginiana	Chokecherry	76	0.88
Corylus americana	Hazel-nut	64	2.27
Rosa spp.	Roses	58	0.75
Ilex verticillata	Winterberry	52	0.50
Gaylussacia baccata	Black huckleberry	47	1.13
Diervilla lonicera	Bush honeysuckle	47	1.44
Amorpha canescens	Lead plant	35	0.50
Corylus cornuta	Beaked hazelnut	29	1.00
Crataegus spp.	Hawthorns	23	0.50
Tree Seedlings			
Quercus alba	White oak	100	1.94
Prunus serotina	Black cherry	100	2.94
Acer rubrum	Red maple	70	0.71
Pinus strobus	White pine	52	0.78
Quer. ellipsoidalis	Northern pin oak	47	0.81
Quercus velutina	Black oak	23	1.13

PVRh

Pinus strobus/Vaccinium-Rubus hispidus (White pine/Blueberry-Dewberry)

Distribution:

Mostly in Jackson county (E of Black River). Natural Subdivision 4a.

Similar types: PVGy, PVHa

Landform and soils:

Nearly level sand plains with sandstone buttes. Similar topography and surface soil as described for PVGy. However, on PVRh sites ground water influence is near the surface - usually within 3 feet. Soil examples are Fairchild, Iron run and Merrilan. In spite of ground water influence vegetation on these sandy soils is decidedly xerophytic. The type is classified as **dry-mesic/poor nutrient**.

Vegetation:

Common forest cover types: *White pine*, *red maple* and *pin oak*, in various mixtures, are most common dominants in current stands. *White oak* and *jack pine* are common associates, *red oak* is usually absent.

Shrub and small tree layer: This layer is generally absent of poorly developed. *Huckleberry* is often conspicuous but other species have low coverage. Those with high constancy are *black cherry*, *serviceberry* and *winterberry (Ilex)*. *Winterberry* is best represented on this type. Conspicu-

ously rare are *gray dogwood*, *chokecherry* and *hazel*. All of these are usually well represented on dry and dry-mesic sites.

Ground flora characteristics: The following group of species with moderate individual constancy values readily distinguish this type from other types in this region: *Partridgeberry*, *swamp dewberry*, *starflower*, *ground pine (Lycopodium obscurum)*, *goldthread*, *bunchberry* and *yellow beadlily*. These species are characteristic members of northern forests and are rarely found in southern habitat types. *Cinnamon fern* sometimes dominates herb layer, especially where ground water is near the surface.

Disturbance and succession:

Records of presettlement conditions show *white pine* as the dominant species on this habitat type. *Red maple* and *pin oak* were probably always present, but assumed dominance after *white pine* was logged off. Since then *white pine* seed source has slowly increased and *white pine* regeneration is now common in many stands.

PVRh

Understory species in order of decreasing constancy, with average coverage.

Scientific name	Common name	Constancy %	Coverage %
Herbs			
<i>Trientalis borealis</i>	Starflower	100	0.50
<i>Aralia nudicaulis</i>	Wild sarsaparilla	87	0.86
<i>Rubus hispidus</i>	Swamp dewberry	87	1.71
<i>Maianthemum canadense</i>	Wild lily-of-the-valley	81	2.58
<i>Uvularia sessilifolia</i>	Sessile-leaved bellwort	81	0.69
<i>Mitchella repens</i>	Partridgeberry	75	0.50
<i>Pteridium aquilinum</i>	Braken fern	75	9.13
<i>Gaultheria procumbens</i>	Wintergreen	62	0.50
<i>Osmunda cinnamomea</i>	Cinnamon fern	62	20.00
<i>Lycopodium obscurum</i>	Ground-pine	56	0.50
Sedges spp.	Sedges	56	0.50
<i>Cornus canadensis</i>	Bunchberry	50	1.44
<i>Coptis groenlandica</i>	Goldthread	43	3.29
Grasses spp.	Grasses	37	0.50
<i>Clintonia borealis</i>	Yellow beadlilly	37	0.50
<i>Aster macrophyllus</i>	Large-leaved aster	37	0.50
<i>Apocynum andro.</i>	Spreading dogbane	31	0.50
<i>Anemone quinquefolia</i>	Wood anemone	31	0.50
<i>Osmunda claytoniana</i>	Interrupted fern	31	1.50
<i>Cypripedium acaule</i>	Pink lady's slipper	25	1.13
<i>Viola</i> spp.	Violets	25	0.50
<i>Symplocarpus foetidus</i>	Skunk cabbage	25	4.75
<i>Dryopteris spinulosa</i>	Spinulose shield fern	25	1.75
<i>Pyrola</i> spp.	Pyrolas	18	0.50
<i>Lysimachia quadrifolia</i>	Whorled loosestrife	18	0.50
<i>Prenanthes alba</i>	White lettuce	18	0.50
Shrubs			
<i>Ilex verticillata</i>	Winterberry	93	1.50
<i>Vaccinium angust.</i>	Low sweet blueberry	87	0.86
<i>Amelanchier</i> spp.	Juneberry	81	0.69
<i>Gaylussacia baccata</i>	Black huckleberry	75	6.63
<i>Rubus</i> spp.	Blackberries/raspberries	43	2.57
<i>Aronia melanocarpa</i>	Black chokeberry	31	0.60
<i>Corylus americana</i>	Hazel-nut	25	0.50
<i>Corylus cornuta</i>	Beaked hazelnut	25	0.50
Tree Seedlings			
<i>Acer rubrum</i>	Red maple	93	0.83
<i>Pinus strobus</i>	White pine	81	2.38
<i>Quercus ellipsoidalis</i>	Northern pin oak	75	0.50
<i>Prunus serotina</i>	Black cherry	75	0.50
<i>Quercus alba</i>	White oak	68	0.95
<i>Populus grandidentata</i>	Bigtooth aspen	37	0.50

ArDe-V

***Acer rubrum/Desmodium* habitat type, *Vaccinium* variant (Red maple/Pointed-leaf tick trefoil, Blueberry variant)**

Distribution:

In northern and western parts of Habitat type Region 7 and throughout Region 6. Also scattered in other counties of Natural Subdivision 6c.

Similar types: PVCr

Landform and soils:

Rolling to hilly topography with sandstone and sometimes dolomitic bedrock. Soils are sandy loam to loam (typical example: Hixton loam). This type represents a distinct **transition between dry and dry-mesic sites**.

Vegetation:

Major forest cover types: *White oak* and *red maple* are the most common dominants in stands that were sampled, but *red oak* is sometimes present. *Pin oak* or *black oak* are much less common than they are on **PVCr** type. *White pine* is often present.

Shrub and small tree layer: This layer is usually well represented. Major species in decreasing order of average coverage are: *Hazel*, *blackberries* and *raspberries*, *serviceberry*, *black cherry*, *gray dogwood* and *bush honeysuckle*. *Red maple* saplings often dominate this layer.

Ground flora characteristics: Number of species and total herb coverage is higher than on other dry types of this region. *Blueberry* occurs here

with small coverage and helps to distinguish **ArDe-V** from **ArCi** and other dry-mesic and mesic types. The species that best distinguishes this type from drier types is *pointed-leaf tick trefoil*. Other diagnostic species with lower constancies are *sweet cicely*, *wild geranium* and *hog peanut*. Best represented species are *bracken fern*, *big-leaf aster*, *tick trefoil*, *wild sarsaparilla* and *Virginia creeper*.

Disturbance and succession: Pre-settlement fire regime favored development of oak communities. *Red oak* is not reproducing adequately in current stands even when *red oak* is dominant in the overstory. *White oak*, however, shows some ability to persist. The most successfully reproducing species is red maple. Based on understory composition and soil characteristics we conclude that *sugar maple* is not a potential climax dominant on this type. *Red maple* is the most shade tolerant species that is well adapted to these sites and is presumed to be climax. It is also possible that *white pine* can again become a permanent member of communities on this type once it can be established as a seed source. Competitive relationship between *white pine* and *red maple* on this type has not been established, however, it appears that under a disturbance regime of moderate fire frequency the two species would co-exist.

ArDe-V

Understory species in order of decreasing constancy, with average coverage.

Scientific name	Common name	Constancy %	Coverage %
Herbs			
Sedges spp.	Sedges	95	0.63
Desmodium glutinosum	Pointed-leaved tick trefoil	90	2.18
Pteridium aquilinum	Braken fern	85	6.31
Aralia nudicaulis	Wild sarsaparilla	76	1.13
Smilacina racemosa	False solomon's seal	71	0.67
Geranium maculatum	Wild geranium	71	0.67
Parthenocissus quinquefolia	Virginia creeper	66	1.89
Amphicarpa bracteata	Hog peanut	61	0.50
Lathyrus ochroleucus	Pale vetchling	61	0.50
Osmorhiza claytoni	Sweet cicely	57	0.50
Aster macrophyllus	Large-leaved aster	57	4.25
Uvularia sessilifolia	Sessile-leaved bellwort	57	1.92
Lysimachia quadrifolia	Whorled loosestrife	57	0.50
Desmodium nudiflorum	Naked-flowered tick trefoil	52	2.27
Goodyera pubescens	Downy rattlesnake plantain	47	0.50
Grasses spp.	Grasses	47	0.50
Pyrola spp.	Pyrolas	47	0.50
Galium triflorum	Sweet-scented bedstraw	42	0.50
Dryopteris spinulosa	Spinulose shield fern	42	0.50
Smilax herbacea	Carrion flower	38	0.50
Apocynum androsaemifolium	Spreading dogbane	38	0.81
Maianthemum canadense	Wild lily-of-the-valley	38	0.50
Anemone quinquefolia	Wood anemone	38	0.50
Potentilla simplex	Common cinquefoil	33	0.50
Fragaria vesca	Wood strawberry	33	0.50
Asclepias spp.	Milkweeds	33	0.50
Solidago spp.	Goldenrods	33	0.50
Phryma leptostachya	Lopseed	33	0.50
Osmunda claytoniana	Interrupted fern	28	1.33
Hepatica americana	Round-lobed hepatica	28	0.50
Polygonatum pubescens	Hairy solomon's seal	28	0.50
Vitis riparia	Riverbank grape	28	0.50
Viola spp.	Violets	23	0.50
Circaea quadrisulcata	Enchanter's nightshade	23	0.50
Rhus radicans	Poison ivy	23	0.50
Uvularia grandiflora	Large-flowered bellwort	23	0.50
Smilax tamnoides	Bristly greenbrier	23	0.50
Sanicula marilandica	Black snakeroot	23	0.50
Shrubs			
Rubus spp.	Blackberries/raspberries	100	3.79
Vaccinium angustifolium	Low sweet blueberry	85	0.50
Amelanchier spp.	Juneberry	85	4.44
Corylus americana	Hazel-nut	80	7.50
Prunus virginiana	Chokecherry	80	0.65
Diervilla lonicera	Bush honeysuckle	71	0.83

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Scientific name	Common name	Constancy %	Coverage %
<i>Cornus racemosa</i>	Gray dogwood	66	1.89
<i>Rosa</i> spp.	Roses	66	0.50
<i>Gaylussacia baccata</i>	Black huckleberry	47	0.75
<i>Viburnum acerifolium</i>	Maple-leaved viburnum	38	0.81
<i>Viburnum rafinesquianum</i>	Downy arrowwood	28	0.92
<i>Ilex verticillata</i>	Winterberry	23	1.00
<i>Ribes</i> spp.	Gooseberries	23	0.50
Tree Seedlings			
<i>Prunus serotina</i>	Black cherry	95	1.38
<i>Acer rubrum</i>	Red maple	95	1.13
<i>Quercus alba</i>	White oak	80	0.94
<i>Quercus velutina</i>	Black oak	38	0.50
<i>Quercus rubra</i>	Northern red oak	38	0.50
<i>Carya ovata</i>	Shagbark hickory	33	0.86
<i>Populus grandidentata</i>	Bigtooth aspen	33	0.50
<i>Carya cordiformis</i>	Bitternut hickory	23	0.50
<i>Ulmus</i> spp.	Elms	23	0.50
<i>Crataegus</i> spp.	Hawthorns	28	0.50

ArCi-Ph

Acer rubrum/Circaea habitat type, *Phryma* variant (Red maple/Enchanters nightshade, Lopseed variant)

Distribution:

ArCi-Ph occurs throughout Region 7 and also in parts of adjacent Region 6. Natural Subdivision 6c .

Similar types: ArCi (Region 6), ATiDe, ATiDe(Pr)

Landform and soils:

On rolling to hilly sandstone terrain, particularly where thin silt loam cap is present. **Dry-mesic, medium to rich.**

Vegetation:

Major forest cover types: *Red oak*, *white oak* and *red maple*, in relatively pure stands or in mixtures, are most common. Mesic hardwoods (*sugar maple*, *basswood*, *white ash*) or *shag-bark hickory* sporadically occur in some stands.

Shrub and small tree layer: This layer is usually well developed. Principal species in descending order of average coverage are: *blackberry*/*raspberry*, *hazel*, *gooseberry*, *gray dogwood*, *serviceberry*, and *choke cherry*. However, red maple and black cherry saplings often dominate this layer.

Ground flora characteristics: ArCi-

Ph is distinguished from drier types of this region by generally lacking *blueberry* and *huckleberry*. Similarly, it is distinguished from the mesic types by general lack of the *blue cohosh* ecological species group (see Table 6.2). Most characteristic species are *nightshade*, *Virginia creeper*, *sweet cicely*, *wild geranium*, and *gooseberries*.

Disturbance and succession: As is

the case with several other plant association described in this field guide the climax nature of this community type has not been adequately studied. The soils do not appear different from those that support tolerant mesic species in other parts of the region. However, these species are generally not found in this community type and *red maple* is presently the most common species capable of reproducing in present oak stands. For these reasons the type is referred to as "community type" rather than habitat type and *red maple* can perhaps be viewed as a "pseudo-climax" until *sugar maple* seed source once again becomes common on sites where fire once controlled community dynamics.

ArCi-Ph

Understory species in order of decreasing constancy, with average coverage.

Scientific name	Common name	Constancy %	Coverage %
Herbs			
<i>Circaea quadrisulcata</i>	Enchanter's nightshade	93	1.88
<i>Osmorhiza claytoni</i>	Sweet cicely	93	1.26
<i>Geranium maculatum</i>	Wild geranium	91	2.15
<i>Desmodium glutinosum</i>	Pointed-leaved tick trefoil	91	1.98
<i>Amphicarpa bracteata</i>	Hog peanut	84	1.77
<i>Phryma leptostachya</i>	Lopseed	82	1.21
Sedges spp.	Sedges	78	0.50
<i>Parthenocissus quinquefolia</i>	Virginia creeper	76	2.73
<i>Galium triflorum</i>	Sweet-scented bedstraw	76	0.57
<i>Viola</i> spp.	Violets	71	0.50
<i>Aralia nudicaulis</i>	Wild sarsaparilla	69	1.44
<i>Dryopteris spinulosa</i>	Spinulose shield fern	65	1.65
<i>Sanicula marilandica</i>	Black snakeroot	63	0.59
<i>Vitis riparia</i>	Riverbank grape	58	0.59
<i>Smilax herbacea</i>	Carion flower	56	0.50
<i>Uvularia grandiflora</i>	Large-flowered bellwort	56	0.69
<i>Uvularia sessilifolia</i>	Sessile-leaved bellwort	52	0.60
Grasses spp.	Grasses	47	0.61
<i>Desmodium nudiflorum</i>	Naked-flowered tick trefoil	45	0.62
<i>Smilacina racemosa</i>	False solomon's seal	43	0.63
<i>Pyrola</i> spp.	Pyrolas	41	0.63
<i>Botrychium virginianum</i>	Rattlesnake fern	41	0.50
<i>Pteridium aquilinum</i>	Braken fern	36	1.09
<i>Athyrium filix-femina</i>	Lady fern	34	1.72
<i>Maianthemum canadense</i>	Wild lily-of-the-valley	34	0.81
<i>Urtica procera</i>	Tall nettle	32	0.50
<i>Geum laciniatum</i>	Rough avens	32	0.50
<i>Actaea</i> spp.	Baneberries	32	0.67
<i>Arisaema atrorubens</i>	Jack-in-the-pulpit	32	0.50
<i>Apocynum androsaemifolium</i>	Spreading dogbane	32	0.50
<i>Osmunda claytoniana</i>	Interrupted fern	30	1.89
<i>Thalictrum dioicum</i>	Early meadow rue	30	0.50
<i>Potentilla simplex</i>	Common cinquefoil	30	0.50
<i>Adiantum pedatum</i>	Maidenhair fern	30	0.50
<i>Aralia racemosa</i>	Spikenard	30	2.93
<i>Agrimonia gryposepala</i>	Agrimony	30	0.50
<i>Rhus radicans</i>	Poison ivy	28	4.65
<i>Aster macrophyllus</i>	Large-leaved aster	28	0.69
<i>Solidago</i> spp.	Goldenrods	28	0.54
<i>Galium boreale</i>	Northern bedstraw	26	0.50
<i>Lysimachia quadrifolia</i>	Whorled loosestrife	23	0.50
<i>Lathyrus ochroleucus</i>	Pale vetchling	23	0.50
<i>Anemone quinquefolia</i>	Wood anemone	23	0.50
<i>Fragaria vesca</i>	Wood strawberry	21	0.50
<i>Smilax tamnoides</i>	Bristly greenbrier	21	0.50

Scientific name	Common name	Constancy %	Coverage %
Shrubs			
Rubus spp.	Blackberries/raspberries	84	4.94
Corylus americana	Hazel-nut	73	2.10
Prunus virginiana	Chokecherry	71	0.95
Cornus racemosa	Gray dogwood	69	1.27
Ribes spp.	Gooseberries	60	2.25
Sambucus canadensis	Common elder	54	0.60
Amelanchier spp.	Juneberry	54	1.18
Rosa spp.	Roses	45	0.86
Diervilla lonicera	Bush honeysuckle	36	0.94
Viburnum lentago	Nannyberry	34	0.50
Salix humilis	Prairie willow	26	0.50
Corylus cornuta	Beaked hazelnut	23	2.95
Tree Seedlings			
Prunus serotina	Black cherry	91	0.74
Acer rubrum	Red maple	76	0.94
Ulmus spp.	Elms	60	0.68
Carya ovata	Shagbark hickory	41	0.76
Quercus alba	White oak	36	0.68
Populus grandidentata	Bigtooth aspen	34	0.50
Acer negundo	Box elder	32	0.50
Tilia americana	Basswood	30	0.50
Quercus rubra	Northern red oak	23	0.50
Carya cordiformis	Bitternut hickory	21	0.75

ATiDe and ATiDe(Pr) *Acer saccharum-Tilia/Desmodium* (Sugar maple-Basswood/Tick trefoil) and *Prunus serotina* (Black cherry) phase

Distribution:

Primarily LaCrosse, western Vernon and Richland and Crawford counties. Natural subdivision 6d.

Landform and soils:

Rolling to hilly topography. Silt loam on cherty clay residuum or silt loam over sandstone on valley walls. All slope aspects, but perhaps more frequently on S and SW. **Dry-mesic, nutrient rich sites.**

Similar types: ArCi, ArCi-Ph, (ATiDe-Ha, ATiDe—In Baraboo section).

Vegetation:

Common forest cover types: *Sugar maple, basswood* and *red oak* are primary dominants in current stands on the **ATiDe** type. The *Prunus* (**Pr**) phase is dominated by *red* and *white oak* with some *black oak*, and *slippery elm*. *Maple* and *basswood* are virtually absent. (See disturbance and succession below).

Shrub and small tree layer: **ATiDe** has relatively sparse shrub layer. **Pr** phase is usually dominated by *gooseberry* (*Ribes* sp.) Other common species are *blackberries*, *black cherry*, *hazel* and *gray dogwood*.

Ground flora characteristics:

Species with high constancy values on both types are: *Pointed-leaf tick trefoil*, *wild geranium*, *lopseed*, *black snakeroot*, *Virginia creeper*, *hog peanut*, *riverbank grape*, and *sweet cicely*. The following species are much better represented on the **ATiDe** than on the **Pr** phase: *Rattlesnake fern*, *naked-flower tick trefoil*, *maidenhair fern*, *zig-zag goldenrod*, and *red baneberry*. Species more often present on the **Pr** phase are: *Agrimony*, *bracken fern*, *false Solomon's seal* and *enchanter's nightshade*.

Disturbance and succession:

Most stands representing the **ATiDe** type were dominated by *sugar maple-basswood* in presettlement time. The stands of the **Pr** phase, on the other hand, developed from oak openings or communities dominated by shrubs. Although there are no mesic hardwoods (e.g. *sugar maple*, *basswood*, *white ash*) present in most of current stands, the soils and understory vegetation suggest that these species are lacking only because of absence of seed source. The **Prunus** phase is therefore viewed only as a developmental phase and not as a different site type.

ATiDe

Understory species in order of decreasing constancy, with average coverage.

Scientific name	Common name	Constancy %	Coverage %
Herbs			
<i>Desmodium glutinosum</i>	Pointed-leaved tick trefoil	96	1.43
<i>Geranium maculatum</i>	Wild geranium	92	0.52
<i>Phryma leptostachya</i>	Lopseed	88	0.43
<i>Sanicula marilandica</i>	Black snakeroot	85	0.32
<i>Parthenocissus quinquefolia</i>	Virginia creeper	81	3.17
<i>Botrychium virginianum</i>	Rattlesnake fern	77	0.36
<i>Rhus radicans</i>	Poison ivy	77	1.42
<i>Amphicarpa bracteata</i>	Hog peanut	74	0.64
Grasses spp.	Grasses	66	0.62
<i>Smilax herbacea</i>	Carrion flower	66	0.35
<i>Uvularia grandiflora</i>	Large-flowered bellwort	66	0.63
<i>Vitis riparia</i>	Riverbank grape	66	0.70
<i>Desmodium nudiflorum</i>	Naked-flowered tick trefoil	62	1.02
<i>Osmorhiza claytoni</i>	Sweet cicely	59	0.44
<i>Adiantum pedatum</i>	Maidenhair fern	55	0.69
<i>Solidago flexicaulis</i>	Zigzag goldenrod	48	0.37
<i>Galium concinnum</i>	Shining bedstraw	44	0.35
<i>Actaea</i> spp.	Baneberries	40	0.10
<i>Galium asprellum</i>	Cleavers	40	0.42
<i>Aralia nudicaulis</i>	Wild sarsaparilla	40	0.98
<i>Aralia racemosa</i>	Spikenard	37	1.46
<i>Dryopteris spinulosa</i>	Spinulose shield fern	33	1.71
<i>Thalictrum dioicum</i>	Early meadow rue	29	1.02
<i>Smilacina racemosa</i>	False solomon's seal	29	0.29
<i>Campanula rapunculoides</i>	Creeping bellflower	29	0.29
<i>Sanguinaria canadensis</i>	Bloodroot	29	0.54
<i>Dioscorea villosa</i>	Wild yam root	29	0.22
<i>Circaea quadrisulcata</i>	Enchanter's nightshade	29	0.29
<i>Smilax tamnoides</i>	Bristly greenbrier	29	0.47
<i>Lysimachia quadrifolia</i>	Whorled loosestrife	25	0.31
<i>Ranunculus</i> spp.	Buttercups	22	0.35
<i>Helianthus</i> spp.	Sunflowers	22	0.43
<i>Aquilegia canadensis</i>	Wild columbine	22	0.18
Shrubs			
<i>Ribes</i> spp.	Gooseberries	74	1.02
<i>Xanthoxylum americanum</i>	Prickly ash	62	1.35
<i>Rubus</i> spp.	Blackberries/raspberries	48	1.29
<i>Prunus virginiana</i>	Chokecherry	44	0.51
<i>Cornus racemosa</i>	Gray dogwood	40	1.25
<i>Cornus alternifolia</i>	Alternate-leaved dogwood	37	1.12
<i>Viburnum acerifolium</i>	Maple-leaved viburnum	29	1.01
<i>Corylus americana</i>	Hazel-nut	29	2.39
<i>Viburnum lentago</i>	Nannyberry	22	0.35

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Scientific name	Common name	Constancy %	Coverage %
Tree Seedlings			
<i>Carya cordiformis</i>	Bitternut hickory	96	0.80
<i>Tilia americana</i>	Basswood	81	0.85
<i>Fraxinus americana</i>	White ash	66	1.82
<i>Quercus rubra</i>	Northern red oak	62	0.34
<i>Carya ovata</i>	Shagbark hickory	59	0.56
<i>Ulmus americana</i>	American elm	59	0.62
<i>Ostrya virginiana</i>	Ironwood	55	1.33
<i>Acer saccharum</i>	Sugar maple	55	1.14
<i>Prunus serotina</i>	Black cherry	51	0.28
<i>Quercus alba</i>	White oak	37	0.44

ATiDe(Pr)

Understory species in order of decreasing constancy, with average coverage.

Scientific name	Common name	Constancy %	Coverage %
Herbs			
<i>Desmodium glutinosum</i>	Pointed-leaved tick trefoil	100	1.43
<i>Phryma leptostachya</i>	Lopseed	90	0.35
<i>Parthenocissus quinquefolia</i>	Virginia creeper	90	1.17
<i>Osmorhiza claytoni</i>	Sweet cicely	81	0.49
<i>Amphicarpa bracteata</i>	Hog peanut	72	0.35
<i>Galium concinnum</i>	Shining bedstraw	72	0.47
<i>Geranium maculatum</i>	Wild geranium	72	0.47
<i>Vitis riparia</i>	Riverbank grape	72	1.01
<i>Smilacina racemosa</i>	False solomon's seal	63	0.24
<i>Rhus radicans</i>	Poison ivy	63	0.87
<i>Sanicula marilandica</i>	Black snakeroot	63	0.87
<i>Circaea quadrisulcata</i>	Enchanter's nightshade	63	0.46
<i>Helianthus</i> spp.	Sunflowers	54	0.67
<i>Agrimonia gryposepala</i>	Agrimony	54	0.10
<i>Smilax herbacea</i>	Carrion flower	45	0.20
<i>Pteridium aquilinum</i>	Braken fern	45	1.36
<i>Dioscorea villosa</i>	Wild yam root	45	0.10
<i>Aralia nudicaulis</i>	Wild sarsaparilla	45	0.88
<i>Uvularia grandiflora</i>	Large-flowered bellwort	45	0.40
<i>Botrychium virginianum</i>	Rattlesnake fern	36	0.22
<i>Dryopteris spinulosa</i>	Spinulose shield fern	36	0.22
<i>Anemone virginiana</i>	Thimble weed	36	0.22
Grasses spp.	Grasses	27	0.60
<i>Desmodium nudiflorum</i>	Naked-flowered tick trefoil	27	0.43
<i>Aster</i> spp.	Asters	27	0.43
<i>Adiantum pedatum</i>	Maidenhair fern	27	0.27
<i>Fragaria vesca</i>	Wood strawberry	27	5.23
<i>Ranunculus</i> spp.	Buttercups	27	0.27
Shrubs			
<i>Rubus</i> spp.	Blackberries/raspberries	100	1.99
<i>Ribes</i> spp.	Gooseberries	90	12.00
<i>Corylus americana</i>	Hazel-nut	63	1.56
<i>Cornus racemosa</i>	Gray dogwood	63	1.49
<i>Prunus virginiana</i>	Chokecherry	54	0.52
<i>Rosa</i> spp.	Roses	45	0.10
<i>Xanthoxylum americanum</i>	Prickly ash	27	1.23
<i>Viburnum lentago</i>	Nannyberry	27	0.43
<i>Lonicera canadensis</i>	American fly honeysuckle	27	0.10
Tree Seedlings			
<i>Prunus serotina</i>	Black cherry	100	0.37
<i>Carya ovata</i>	Shagbark hickory	81	0.64
<i>Carya cordiformis</i>	Bitternut hickory	72	0.36
<i>Quercus rubra</i>	Northern red oak	63	0.17
<i>Acer negundo</i>	Box elder	54	0.52
<i>Ulmus americana</i>	American elm	54	1.40
<i>Quercus alba</i>	White oak	45	0.20
<i>Acer rubrum</i>	Red maple	27	0.60

ATiCa and ATiSa
Acer saccharum-Tilia/Caulophyllum
(Sugar maple-Basswood/Blue cohosh)
and
Acer saccharum-Tilia/Sanguinaria
(Sugar maple-Basswood/Bloodroot)

Distribution:

Primarily Richland county and eastern parts of Vernon and Crawford counties. Also in parts of Sauk county. Natural Subdivision 6a.

Similar habitat types: ATiCa-Al (Baraboo Section)

Landform and soils:

Rolling to steep terrain. Silt loams over cherty red clay over dolomite and sandstone. **ATiCa** is strongly associated with N and E aspects and represents **mesic, nutrient very rich** sites while **ATiSa** is more typical of S and SW aspects and represents a transition from **mesic to dry-mesic** conditions.

Vegetation:

Major forest cover types: Most stands on both of these habitat types are dominated by *sugar maple* and *basswood*. *Red oak* is well represented only in the larger diameter classes (>10 inches dbh). *Bitternut hickory* and *ironwood* are the only other common associates. *White oak* is less common.

Shrub and small tree layer:

Shrubs are poorly represented on these types. If this layer is well developed it is comprised largely of saplings of canopy tree species. The only shrubs commonly found here are *gooseberries*, *alternate-leaf dogwood* and *prickly ash*.

Ground flora characteristics:

Both types contain many understory species typical of mesic sites in all regions, e.g.: *bloodroot*, *large-flowered bellwort*, *rattlesnake fern*, *maidenhair fern*. However, many other mesic species have distinctly higher constancies on **ATiCa** than **ATiSa** type. These are: *blue cohosh*, *jack-in-the-pulpit*, *baneberry*, *trillium*, *sharp-lobed hepatica*, and *wild ginger*. On the other hand, **ATiSa** is further distinguished from **ATiCa** by higher constancies of *tick trefoil* and *riverbank grape* as well as *shagbark hickory*, *ironwood (Ostrya)* and *basswood*.

Disturbance and succession:

These two habitat types repre-

sent the largest block of presettlement mesic forest in SW Wisconsin. Dominance of *sugar maple-basswood* forest cannot be attributed to any particular site conditions although they are clearly best developed on N and E aspects and on deep silt loams. Many similar sites in the region are occupied by oak communities and they entirely lack mesic hardwoods. Historic exclusion of fires due to natural fire barriers or other reasons is considered to be the primary cause of this vegeta-

tion pattern. Heavy cutting, grazing and other disturbances resulted in an increase of oaks and other intolerant species on many sites. However, oaks are not regenerating in these stands. *Sugar maple*, *basswood* and especially *ironwood (Ostrya)* are most common seedlings and saplings. Bitternut hickory is also present in many stands. *White ash* is much less common than it is in the mesic and dry-mesic forests in the eastern part of the state, especially in region 11.

ATiSa

Understory species in order of decreasing constancy, with average coverage

Scientific name	Common name	Constancy %	Coverage %
Herbs			
<i>Geranium maculatum</i>	Wild geranium	94	0.46
<i>Sanguinaria canadensis</i>	Bloodroot	89	0.49
<i>Phryma leptostachya</i>	Lopseed	78	0.72
<i>Uvularia grandiflora</i>	Large-flowered bellwort	73	0.66
<i>Osmorhiza claytoni</i>	Sweet cicely	73	0.42
<i>Botrychium virginianum</i>	Rattlesnake fern	73	0.59
Grasses spp.	Grasses	73	0.91
<i>Solidago flexicaulis</i>	Zigzag goldenrod	68	0.93
<i>Adiantum pedatum</i>	Maidenhair fern	68	1.18
<i>Amphicarpa bracteata</i>	Hog peanut	68	1.93
<i>Desmodium glutinosum</i>	Pointed-leaved tick trefoil	68	1.05
<i>Sanicula marilandica</i>	Black snakeroot	68	0.37
<i>Galium concinnum</i>	Shining bedstraw	63	0.35
<i>Smilax herbacea</i>	Carrion flower	63	0.31
<i>Polygonatum pubescens</i>	Hairy solomon's seal	63	0.14
<i>Thalictrum dioicum</i>	Early meadow rue	57	0.81
<i>Smilacina racemosa</i>	False solomon's seal	57	0.42
Aster spp.	Asters	57	0.37
<i>Vitis riparia</i>	Riverbank grape	57	0.37
<i>Dryopteris spinulosa</i>	Spinulose shield fern	52	0.88
<i>Parthenocissus quinquefolia</i>	Virginia creeper	47	2.51
<i>Rhus radicans</i>	Poison ivy	42	0.52
<i>Aralia nudicaulis</i>	Wild sarsaparilla	36	0.31
<i>Dioscorea villosa</i>	Wild yam root	36	0.24
<i>Arisaema atrorubens</i>	Jack-in-the-pulpit	36	0.31
<i>Viola</i> spp.	Violets	31	0.18
<i>Galium asprellum</i>	Cleavers	31	0.10
<i>Aquilegia canadensis</i>	Wild columbine	31	0.92
<i>Ranunculus</i> spp.	Buttercups	31	0.18
<i>Anemone virginiana</i>	Thimble weed	26	0.10
<i>Smilax tamnoides</i>	Bristly greenbrier	26	0.20
<i>Aralia racemosa</i>	Spikenard	21	1.55
<i>Ranunculus hispidus</i>	Hispid buttercup	21	0.22
<i>Fragaria vesca</i>	Wood strawberry	21	0.22
<i>Caulophyllum thalictroides</i>	Blue cohosh	21	0.10
Shrubs			
<i>Ribes</i> spp.	Gooseberries	78	0.30
<i>Prunus virginiana</i>	Chokecherry	57	0.64
<i>Xanthoxylum americanum</i>	Prickly ash	52	0.35
<i>Viburnum acerifolium</i>	Maple-leaved viburnum	47	3.21
<i>Cornus alternifolia</i>	Alternate-leaved dogwood	26	1.46
<i>Rubus</i> spp.	Blackberries/raspberries	21	0.35
<i>Cornus racemosa</i>	Gray dogwood	21	0.10

Scientific name	Common name	Constancy %	Coverage %
Tree Seedlings			
<i>Acer saccharum</i>	Sugar maple	100	2.37
<i>Carya cordiformis</i>	Bitternut hickory	94	0.60
<i>Tilia americana</i>	Basswood	78	0.46
<i>Quercus rubra</i>	Northern red oak	73	0.24
<i>Prunus serotina</i>	Black cherry	63	0.15
<i>Ostrya virginiana</i>	Ironwood	57	1.85
<i>Fraxinus americana</i>	White ash	57	0.50
<i>Carya ovata</i>	Shagbark hickory	47	0.27
<i>Carpinus caroliniana</i>	American hornbeam	36	2.86
<i>Quercus alba</i>	White oak	31	0.10
<i>Fraxinus pennsylvanica</i>	Green ash	26	1.08
<i>Ulmus americana</i>	American elm	21	0.10

ATiCa

Understory species in order of decreasing constancy, with average coverage.

Scientific name	Common name	Constancy %	Coverage %
Herbs			
<i>Sanguinaria canadensis</i>	Bloodroot	96	0.43
<i>Osmorhiza claytoni</i>	Sweet cicely	85	0.37
<i>Sanicula marilandica</i>	Black snakeroot	85	1.21
<i>Uvularia grandiflora</i>	Large-flowered bellwort	82	1.50
<i>Solidago flexicaulis</i>	Zigzag goldenrod	82	1.35
<i>Circaea quadrisulcata</i>	Enchanter's nightshade	82	0.47
<i>Polygonatum pubescens</i>	Hairy solomon's seal	71	0.35
<i>Botrychium virginianum</i>	Rattlesnake fern	71	0.30
<i>Adiantum pedatum</i>	Maidenhair fern	71	3.91
<i>Dryopteris spinulosa</i>	Spinulose shield fern	71	3.16
<i>Geranium maculatum</i>	Wild geranium	64	0.32
<i>Caulophyllum thalictroides</i>	Blue cohosh	64	0.67
<i>Phryma leptostachya</i>	Lopseed	64	0.54
<i>Parthenocissus quinquefolia</i>	Virginia creeper	64	1.04
<i>Arisaema atrorubens</i>	Jack-in-the-pulpit	60	0.22
<i>Smilax herbacea</i>	Carrion flower	60	0.36
<i>Actaea</i> spp.	Baneberries	60	0.31
<i>Amphicarpa bracteata</i>	Hog peanut	57	0.59
<i>Trillium</i> spp.	Trilliums	57	0.29
<i>Thalictrum dioicum</i>	Early meadow rue	50	2.31
<i>Viola pensylvanica</i>	Smooth yellow violet	50	0.80
<i>Smilacina racemosa</i>	False solomon's seal	46	0.55
<i>Hepatica acutiloba</i>	Sharp-lobed hepatica	39	0.55
<i>Galium concinnum</i>	Shining bedstraw	39	0.19
<i>Asarum canadense</i>	Wild ginger	39	8.05
<i>Galium asprellum</i>	Cleavers	39	0.28
<i>Smilax tamnoides</i>	Bristly greenbrier	35	0.15
<i>Desmodium glutinosum</i>	Pointed-leaved tick trefoil	35	0.49
<i>Mitella diphylla</i>	Miterwort	35	2.03
Grasses spp.	Grasses	32	0.27
<i>Viola</i> spp.	Violets	32	1.02
<i>Aralia racemosa</i>	Spikenard	32	6.99
<i>Ranunculus</i> spp.	Buttercups	32	0.32
<i>Osmunda claytoniana</i>	Interrupted fern	28	1.61
<i>Rhus radicans</i>	Poison ivy	25	0.24
<i>Aralia nudicaulis</i>	Wild sarsaparilla	25	3.20
<i>Podophyllum peltatum</i>	Mayapple	21	0.18
<i>Vitis riparia</i>	Riverbank grape	21	0.10

Scientific name	Common name	Constancy %	Coverage %
Shrubs			
Ribes spp.	Gooseberries	85	0.41
Cornus alternifolia	Alternate-leaved dogwood	64	2.00
Prunus virginiana	Chokecherry	57	0.56
Xanthoxylum americanum	Prickly ash	42	0.22
Viburnum acerifolium	Maple-leaved viburnum	32	2.83
Rubus spp.	Blackberries/raspberries	21	0.18
Hamamelis virginiana	Witch hazel	21	10.52
Tree Seedlings			
Carya cordiformis	Bitternut hickory	100	0.68
Acer saccharum	Sugar maple	96	2.25
Quercus rubra	Northern red oak	57	0.13
Fraxinus americana	White ash	57	0.50
Tilia americana	Basswood	46	0.48
Prunus serotina	Black cherry	42	0.22
Ostrya virginiana	Ironwood	39	0.24
Ulmus americana	American elm	39	0.41
Carpinus caroliniana	American hornbeam	32	0.53
Fraxinus pennsylvanica	Green ash	25	0.73

Understory Species with Potential Diagnostic Value for Distinguishing the Habitat Types of Region 7

Numbers represent frequency of occurrence classes: * 10-25%; 1, 26-50%; 2, 51-75%; 3, 76-100%. Letters are coverage classes: A <5%; B 6-15%; C >15%.

Scientific Name	Common Name	PVGy		PVRh	ArCi-Ph	ATiDe(Pr)	ATiCa		
		PVCr	ArDe-V	ArDe-V	ATiDe	ATiSa			
Herbs									
<i>Euphorbia corollata</i>	Flowering spurge	1 A	1 A						
<i>Mitchella repens</i>	Partridgeberry		*	2 A					
<i>Clintonia borealis</i>	Yellow beadlily			1 A					
<i>Coptis groenlandica</i>	Goldthread			1 A					
<i>Cornus canadensis</i>	Bunchberry			1 A					
<i>Lycopodium obscurum</i>	Ground-pine			2 A					
<i>Osmunda cinnamomea</i>	Cinnamon fern			2 C					
<i>Rubus hispidus</i>	Swamp dewberry			3 A					
<i>Osmunda claytoniana</i>	Interrupted fern			1 A	1 A	1 A			1 A
<i>Prenanthes alba</i>	White lettuce			*	*	*		*	
<i>Goodyera pubescens</i>	Downy rattlesn. plantain	*	*		1 A	*			
<i>Potentilla simplex</i>	Common cinquefoil	*	*		1 A	1 A			
<i>Streptopus roseus</i>	Rosey twisted stalk	*			*	*			
<i>Aster sagittifolius</i>	Arrow-leaved aster	*	*		*	*			
<i>Gaultheria procumbens</i>	Wintergreen	2 A	*	2 A					
<i>Trientalis americana</i>	Starflower	1 A	1 A	3 A	*	*			
Sedges spp.	Sedges	3 A	3 A	2 A	3 A	3 A			
<i>Apocynum andro.</i>	Spreading dogbane	2 A	2 A	1 A	1 A	1 A			
<i>Anemone quinquefolia</i>	Wood anemone	*	*	1 A	1 A	*			
<i>Maianthemum canad.</i>	Wild lily-of-the-valley	2 A	3 A	3 A	1 A	1 A			
<i>Aster macrophyllus</i>	Large-leaved aster	1 A	1 A	1 A	2 A	1 A			*
<i>Lysimachia quadrifolia</i>	Whorled looserife	2 A	1 A	*	2 A	*	*		
<i>Smilacina stellata</i>	Star-flwr. solomon's seal	*	*		*	*			
<i>Pteridium aquilinum</i>	Braken fern	3 C	3 B	2 B	3 B	1 A	*	1 A	
<i>Aquilegia canadensis</i>	Wild columbine	*	*		*	*	*		1 A
<i>Fragaria vesca</i>	Wood strawberry	*	*		1 A	*	*	1 B	*
<i>Uvularia sessilifolia</i>	Sessile-leaved bellwort	2 A	2 A	3 A	2 A	2 A	*		*
<i>Aralia nudicaulis</i>	Wild sarsaparilla	1 A	3 A	3 A	3 A	2 A	1 A	1 A	1 A
<i>Smilacina racemosa</i>	False solomon's seal	1 A	3 A	*	2 A	1 A	1 A	2 A	2 A
Grasses spp.	Grasses	1 A	1 A	1 A	1 A	1 A	2 A	1 A	2 A
<i>Pyrola</i> spp.	Pyrolas		1 A	*	1 A	1 A			
<i>Parthenocissus quinq.</i>	Virginia creeper	2 A	*	2 A	3 A	3 A	3 A	1 A	2 A
<i>Smilax tamnoides</i>	Bristly greenbrier	1 A	*	*	*	1 A		1 A	1 A
<i>Athyrium filix-femina</i>	Lady fern				*	1 A			*
<i>Lathyrus ochroleucus</i>	Pale vetchling		1 A		2 A	*			
<i>Galium boreale</i>	Northern bedstraw		*		*	1 A			
<i>Hepatica americana</i>	Round-lobed hepatica		*		1 A				
<i>Galium triflorum</i>	Sweet-scent. bedstraw		*		1 A	3 A			*
<i>Solidago</i> spp.	Goldenrods				1 A	1 A	*	*	
<i>Urtica procera</i>	Tall nettle				1 A				
<i>Campanula rapuncul.</i>	Creeping bellflower					1 A			

Scientific Name	Common Name	PVGy	PVRh	ArCl-Ph	ATiDe(Pr)	ATiCa		
		PVCr	ArDe-V	ATiDe	ATiSa			
<i>Helianthus</i> spp.	Sunflowers				*	2A		
<i>Desmodium nudiflorum</i>	Naked-flwr. tick trefoil			2A	1A	2A	1A	*
<i>Viola</i> spp.	Violets	*	*	*	2A	*		1A 1A
<i>Dryopteris spinulosa</i>	Spinulose shield fern	1A	*	1A	2A	1A	1A	2A 2A
<i>Vitis riparia</i>	Riverbank grape	1A		1A	2A	2A	2A	*
<i>Smilax herbacea</i>	Carrion flower	*		1A	2A	2A	1A	2A 2A
<i>Desmodium glutinosum</i>	Pointed-lvd. tick trefoil	*		3A	3A	3A	3A	2A 1A
<i>Geranium maculatum</i>	Wild geranium	*		2A	3A	3A	2A	3A 2A
<i>Circaea quadrisulcata</i>	Enchanter's nightshade			*	3A	1A	2A	* 3A
<i>Rhus radicans</i>	Poison ivy	*		*	1A	3A	2A	1A *
<i>Amphicarpa bracteata</i>	Hog peanut			2A	3A	2A	2A	2A 2A
<i>Uvularia grandiflora</i>	Large-flwr. bellwort			*	2A	2A	1A	2A 3A
<i>Phryma leptostachya</i>	Lopseed			1A	3A	3A	3A	3A 2A
<i>Sanicula marilandica</i>	Black snakeroot			*	2A	3A	2A	2A 3A
<i>Polygonatum pubes.</i>	Hairy solomon's seal	*		1A	*			2A 2A
<i>Osmorhiza claytoni</i>	Sweet cicely			2A	3A	2A	3A	2A 3A
<i>Adiantum pedatum</i>	Maidenhair fern				1A	2A	1A	2A 2A
<i>Botrychium virginianum</i>	Rattlesnake fern				1A	3A	1A	2A 2A
<i>Dioscorea villosa</i>	Wild yam root				*	1A	1A	1A *
<i>Aster</i> spp.	Asters				*	1A	2A	*
<i>Galium concinnum</i>	Shining bedstraw			*		1A	2A	2A 1A
<i>Ranunculus</i> spp.	Buttercups				*	1A	1A	1A
<i>Anemone virginiana</i>	Thimble weed					1A	1A	*
<i>Agrimonia gryposepala</i>	Agrimony				1A		2A	*
<i>Thalictrum dioicum</i>	Early meadow rue			*	1A	1A		2A 1A
<i>Aralia racemosa</i>	Spikenard				1A	1A		* 1B
<i>Actaea</i> spp.	Baneberries				1A	1A		* 2A
<i>Arisaema atrorubens</i>	Jack-in-the-pulpit				1A	*		1A 2A
<i>Solidago flexicaulis</i>	Zigzag goldenrod					1A		2A 3A
<i>Caulophyllum thal.</i>	Blue cohosh					*		* 2A
<i>Sanguinaria canad.</i>	Bloodroot					1A		3A 3A
<i>Galium asprellum</i>	Cleavers					1A		1A 1A
<i>Viola pensylvanica</i>	Smooth yellow violet					*		* 1A
<i>Hepatica acutiloba</i>	Sharp-lobed hepatica							* 1A
<i>Trillium</i> spp.	Trilliums							* 2A
<i>Asarum canadense</i>	Wild ginger							* 1B
<i>Polemonium reptans</i>	Greek valerian							* *
<i>Ranunculus hispidus</i>	Hispid buttercup							* *
<i>Eupatorium rugosum</i>	White snakeroot						*	*
<i>Laportea canadensis</i>	Wood nettle							*
<i>Podophyllum peltatum</i>	Mayapple							*
<i>Allium tricoccum</i>	Wild leek							*
<i>Cryptotaenia can.</i>	Honewort							*
<i>Hydrophyllum virgin.</i>	Virginia waterleaf							*
<i>Mitella diphylla</i>	Miterwort							1A

continued...

...continued

Scientific Name	Common Name	PVGy	PVRh	ArCi-Ph	ATIDe(Pr)	ATICa				
		PVCr	ArDe-V	ATIDe	ATISa					
Shrubs										
<i>Amorpha canescens</i>	Lead plant	*	1 A							
<i>Aronia melanocarpa</i>	Black chokeberry			1 A						
<i>Gaylussacia baccata</i>	Black huckleberry	3 B	1 A	2 B	1 A					
<i>Amelanchier</i> spp.	Juneberry	3 A	3 A	3 A	3 A	2 A				
<i>Vaccinium angust.</i>	Low sweet blueberry	3 A	3 A	3 A	3 A	*				
<i>Ilex verticillata</i>	Winterberry	*	2 A	3 A	*	*				
<i>Corylus cornuta</i>	Beaked hazelnut	*	1 A	*	*	*		*		
<i>Rosa</i> spp.	Roses	2 A	2 A		2 A	1 A	*	1 A		
<i>Diervilla lonicera</i>	Bush honeysuckle	1 A	1 A		2 A	1 A		*	*	
<i>Corylus americana</i>	Hazel-nut	1 A	2 A	*	3 B	2 A	1 A	2 A	*	
<i>Viburnum acerifolium</i>	Maple-ldd. viburnum	*	*		1 A	*	1 A		1 A	1 A
<i>Prunus virginiana</i>	Chokecherry	*	3 A		3 A	2 A	1 A	2 A	2 A	2 A
<i>Rubus</i> spp.	Blackber./raspber.	2 A	3 A	1 A	3 A	3 A	1 A	3 A	*	*
<i>Crataegus</i> spp.	Hawthorns		*		1 A	*				
<i>Viburnum raf.</i>	Downy arrowwood		*		1 A				*	
<i>Sambucus canadensis</i>	Common elder					2 A				
<i>Lonicera canadensis</i>	Amer. fly honeysuckle						*	1 A	*	
<i>Cornus racemosa</i>	Gray dogwood		3 A		2 A	2 A	1 A	2 A	*	
<i>Cornus alternifolia</i>	Alternate-ldd dogwood			*	*	*	1 A	*	1 A	2 A
<i>Ribes</i> spp.	Gooseberries		*		*	2 A	2 A	3 B	3 A	3 A
<i>Viburnum lentago</i>	Nannyberry				*	1 A	*	1 A		*
<i>Xanthoxylum amer.</i>	Prickly ash		*			*	2 A	1 A	2 A	1 A

Occurrence of Tree Species on Habitat Types of Region 7

Size classes: SE - seedlings; SA - saplings; MT - medium trees (4-10" DBH); LT - large trees (>10" DBH). Numbers are frequency of occurrence: * <10%; 1, 10-25%; 2, 26-50%; 3, 51-75%; 4, 76-100%. Letters are coverage classes: A <5%; B 5-15%; C 16-35%; D >35%.

	PVGy				PVCr				PVRh				ArDe-V				ArCi-Ph				ATiDe(Pr)				ATiDe				ATiSa				ATiCa						
	SE	SA	MT	LT	SE	SA	MT	LT	SE	SA	MT	LT	SE	SA	MT	LT	SE	SA	MT	LT	SE	SA	MT	LT	SE	SA	MT	LT	SE	SA	MT	LT	SE	SA	MT	LT	SE	SA	MT
Jack pine	1A	1A	2B	1B	1A		1A	*				1B	1B					*																					
Bur oak	*	*				*	*							*	*	*	*		*	*	1B	*																	
Northern pin oak	3A	2A	3C	3C	2A	2A	2B	2C	3A	1A	1B	2B	*	1A	1B	1D	*	*	*	*					*	*	*	*											
Trembling aspen	*		*	*					1A		1A	*					*	*	*	*			*	*			*	*	*	*									
Bigtooth aspen	2A	*	1A	1B	*	1A	1B	1D	2A	*	1B	1A	2A	1A	1A	1D	2A	*	1A	1C	*	1A	*		*	*	*	1C	2A	*	1A	1C	*			*			
Red pine	1A	1A	1B	1B						*	1A	1B				*							*				*												
Black oak	*	*	1D	1C	1A	1A	1B	2D	1A			*	2A	1A	2A	2D	1A	*	1B	2D	1A	1B	1C	2D	*	*	*	*	1A	*	1B	2D							
Black walnut																		*	*	*	*		*	*		*	*										*		
Paper birch	*	*	*		*		1A		1A	2A	2A	1A		*	*			*	*	1B			*	*		*	*		*	*	1B								
Black ash																																							
Northern red oak	*	*	*	*			*	*	*					2A	1A	2B	2D	1A	1A	2B	3D	2A	1A	2B	3D	1A	1A	3B	3D	1A	1A	2B	3D	2A	*	1B	3C		
White pine	3A	3A	2B	1D	2A	2B	2B	2C	4A	3B	3B	3D	1A	1B	2A	1C	*	*	*	*					*	*	*	*											
White oak	3A	2B	2B	1A	4A	3A	4B	2C	3A	2A	1A	1C	4A	3B	3A	3B	2A	1A	2B	2B	2A	2A	2C	3B	1A	*	2B	1C	2A	1A	2B	2B			1A	1C			
Butternut														*	*	*	*	*	*	*	*						*	*	*	*	*	*	*	*	*	*	*	*	1B
Swamp white oak																																							
Shagbark hickory	*													2A	2B	*		2A	2B	2B	1C	3A	2B	2B	1C	3A	2A	1B	1B	2A	2B	2B	1C	*	1B	*	1B		
Black cherry	3A	2A	*		4A	4B	1A		3A	*			4A	4A	1A	*	4A	3A	2B	1B	4A	3A	2B	*	2A	1A	*	*	4A	3A	2B	1B	2A	*	*	*	*		
Box elder	*				*								1A				2A	2A	*		3A	2B			1A				2A	2A	*								
Hackberry																	*												*										
Elms					*	1A			*	*			1A				3A	2B	1B									3A	2B	1B									
American elm																						3A	3B	2B	1B	2A	2A	*						1A	1A	1B			
White ash					*	*							1A	1B	*	*	1A	1A	*		*	1A	1A		3A	2A	1B	1B	1A	1A	*			3A	1B	1B	1B		
Green ash																										*	*		*							2A	1A	*	
Yellow birch									*		*																								*	*	*		
Bitternut hickory	*	*			1A	1B							1A	1A			1A	1B	1B		3A	2A	2B	*	4A	3A	1B		1A	1B	1B		3A	2A	2B	1B			
Red maple	3A	3B	2B	*	3A	3B	2C	*	4A	4C	4C	2B	4A	4C	4B	1A	3A	4C	3C	2B	2A	2B	2B	1B	*	1A	1C	*	3A	4C	3C	2B	*	*	*				
American hornbeam													1A	2B			*	*			*	*				*	1B			*	*			2A	1A				
Ironwood					*								*	1B	*		1A	1A	*	*	*					3A	4B	1B		1A	1A	*	*	2A	3B	2A	*		
Basswood	*				*	*	*						*	1A	*	*	2A	1B	1B	1B	1A	2A			3A	3A	2C	2C	2A	1B	1B	1B	2A	2A	2B	3C			
Eastern hemlock																																							
American beech																																							
Sugar maple													*	1A	1A		*	1C	*	1B		*	*		3A	3B	3C	2C	*	1C	*	1B	4A	4C	4C	3D			

Baraboo Hills Section

This section is treated separately for several reasons. Although it lies in Region 7, the Baraboo Range (also called Baraboo Hills or Baraboo Bluffs) represents a unique physiographic unit with implications for climate, soils, natural disturbance regimes and patterns of human land use. For all these reasons it has also received more attention from ecologists. A cooperative project between The Nature Conservancy and the Wisconsin Department of Natural Resources provided opportunity for more intensive vegetation sampling of the Baraboo Hills than was possible for the rest of Region 7. Keeping Baraboo data and interpretations separate will make this field guide easier to use as a management tool and will facilitate future research.

Extent, topography, geology and soils

The Baraboo Range, located in Sauk County, is a large outcrop (monadnock) of Precambrian quartzite. It forms an elliptical formation approximately 25 miles long (east to west) with an average width of 5 miles. Greatest relief is attained in the vicinity of Devils Lake where several bluffs, with associated tallus, rise 500 feet above the base. The range is bordered in the east by the Wis-

consin River bottomlands of the Central Plain and in the west by the dissected sandstone and dolomite hills of the Western Upland. The eastern one third of the Range was glaciated, while the remainder of it was not. The hilly portions of the glaciated region are overlain by till while the valleys contain extensive outwash plains and outwash terraces.

The soils are primarily silt loams and secondarily loams, sandy loams and sands. The silt loams of the Baraboo Range developed in 20-40 inches of loess over quartzite bedrock in the unglaciated portion, and over till in the glaciated part. The Range influences local precipitation patterns and there is considerable variation in the length of growing season.

Forest vegetation

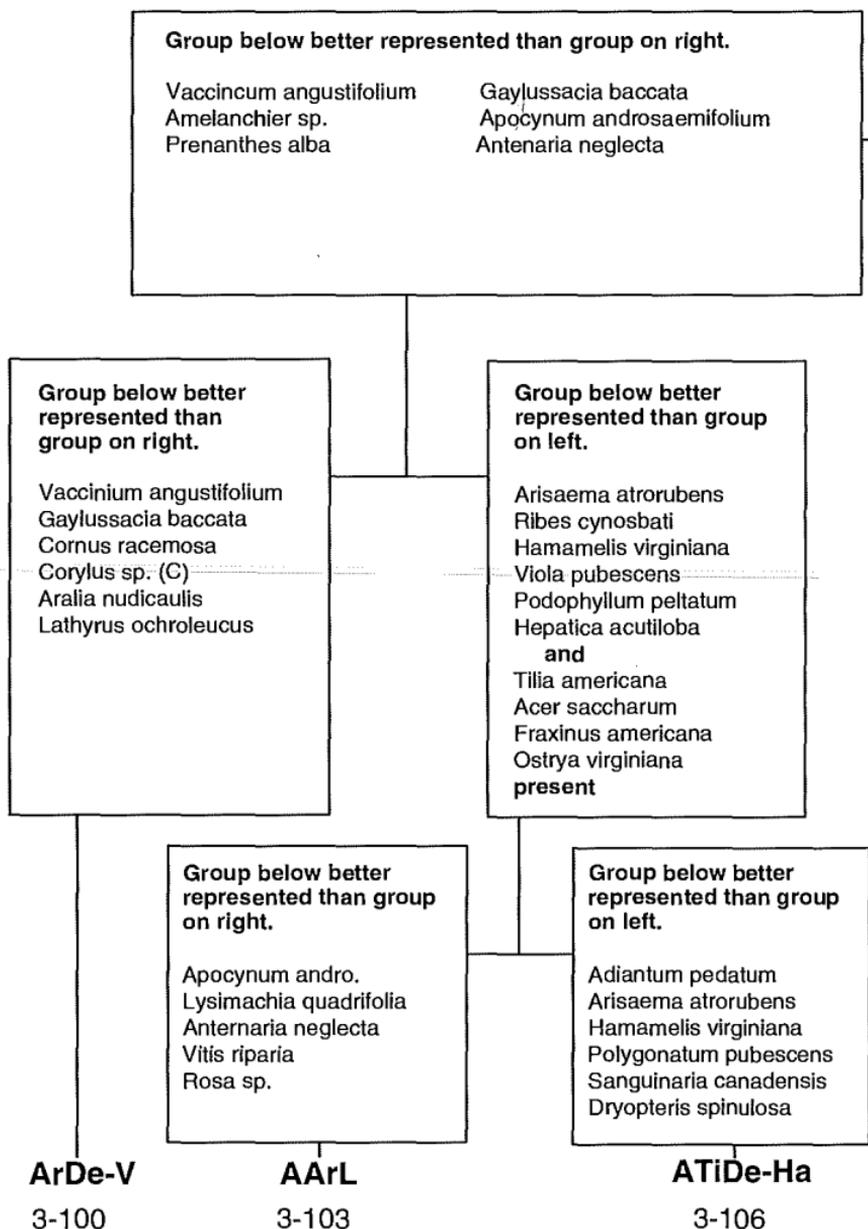
In presettlement time oak savanna and oak forests dominated approximately two thirds of the Baraboo Hills region. Prairies and other type of forests accounted for the remainder. Sugar maple - basswood forests occurred in scattered locations, in landscape positions that were protected from fire for long periods of time. In a few locations relics of more northern forest type was found. These relics con-

tained hemlock, yellow birch and a number of understory species characteristic of northern forest. White pine also occurred in a few isolated patches and as scattered trees on extensive tallus slopes. On the droughtiest sands mixtures of oak and jack pine were found.

The Baraboo Range today represents the largest contiguous block of forest and woodland in southern Wisconsin. Although the extent of forest cover in the Baraboo Range has not changed greatly since early settlement, the composition of forest communities has been drastically altered. In addition to clearing for homesteads, forests have been cut for diverse uses such as lumber, railroad ties, roundwood for specific products, fuel for lime kilns, char-

coal, and others. Each of these uses had a different effect on subsequent forest development and present composition. In general, red oak has become much more prominent in postsettlement forests than it was before, but it is not regenerating without disturbance. Red maple, black cherry and ironwood (*Ostrya*) are the most prominent species in the smaller size classes. These species were not well represented in presettlement forests. Shagbark hickory is another species gaining prominence in oak forests. Sugar maple and basswood abundance has been greatly reduced in their former locations, but these species are again gaining a foothold where fires, grazing and heavy cutting have been eliminated.

Key to Habitat Types of the Baraboo Hills Section - Scientific Names



Group below well represented: Several species are found rather than any one being common.

Poorly represented: Usually no more than one species from the group present. Abundance may be low or high.

(C) - Common: >1%

Group below better represented than group on left.

Caulophyllum thalictroides
Mitella diphylla
Cryptotaenea canadensis
Hydrophyllum virginianum
Symplocarpus foetidus

Actaea sp.
Laportea canadensis
Allium tricoccum
Sambucus pubens
Mitchella repens

Group below better represented than group on right.

Botrychium virginianum
Cryptotaenia canadensis
Desmodium glutinosum
Geranium maculatum
Smilacina racemosa
Viola pubescens

Species on left rarely present. Species below commonly present:

Mitchella repens
Dryopteris phegopteris
Circaea alpina
Lycopodium lucidulum
Aster macrophyllus
Tsuga canadensis
Betula alleghaniensis

Group below better represented than group on right.

Desmodium sp.
Aralia nudicaulis
Vitis riparia
Parthenocissus quinq. (C)

Group below better represented than group on left.

Hepatica acutiloba
Mitella diphylla
Trillium sp.
Allium tricoccum
Caulophyllum thal.
Hamamelis virg. (C)

ATIDe-As

3-106

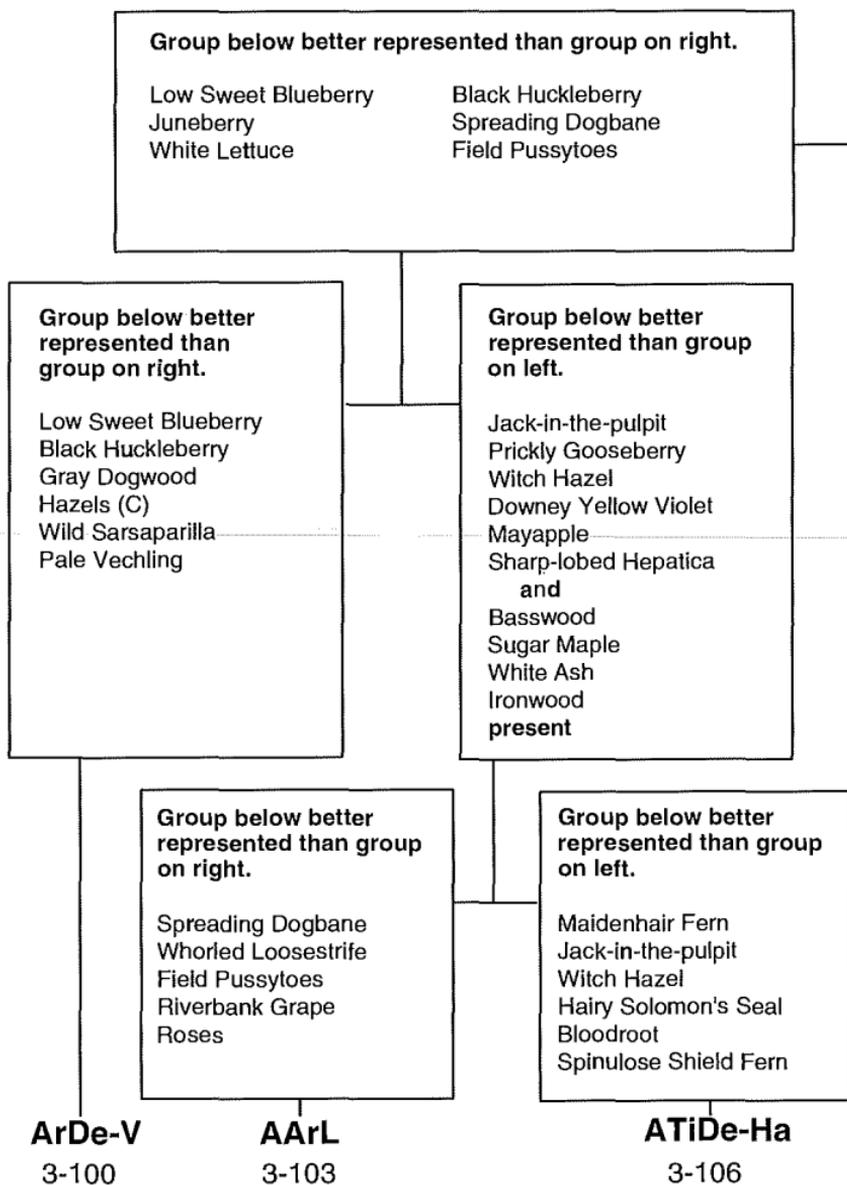
ATICa-AI

3-114

ATTr

3-111

Key to Habitat Types of the Baraboo Hills Region - Common Names



Group below well represented: Several species are found rather than any one being common.

Poorly represented: Usually no more than one species from the group present. Abundance may be low or high.

(C) - Common: >1%

Group below better represented than group on left.

Blue Cohosh
Miterwort
Honewort
Virginia Waterleaf

Baneberries
Wood Nettle
Wild Leek
Red-berried Elder

Group below better represented than group on right.

Rattlesnake Fern
Honewort
Pointed-leaved Tick Trefoil
Wild Geranium
False Solomon's Seal
Downy Yellow Violet

Species on left rarely present. Species below commonly present:

Partridgeberry
Long Beech Fern
Dwarf Enchanter's
Nightshade
Shining Club Moss
Large-leaved Aster
Hemlock
Yellow Birch

Group below better represented than group on right.

Tick Trefoils
Wild Sarsaparilla
Riverbank Grape
Virginia Creeper (C)

Group below better represented than group on left.

Sharp-lobed Hepatica
Miterwort
Trilliums
Wild Leek
Blue Cohosh
Witch Hazel (C)

ATiDe-As

3-106

ATiCa-AI

3-114

ATTr

3-111

Comparison of Major Floristic Differences Between Closely Related Habitat Types in Baraboo Hills

		ArDe-V	AArL
Vaccinium angust.	Low sweet blueberry	85	4
Aralia nudicaulis	Wild sarsaparilla	76	32
Diervilla lonicera	Bush honeysuckle	71	25
Cornus racemosa	Gray dogwood	66	18
Lathyrus ochroleucus	Pale vetchling	61	14
Uvularia sessilifolia	Sessile-leaved bellwort	57	18
Gaylussacia baccata	Black huckleberry	47	7
Phryma leptostachya	Lopseed	33	82
Viburnum acerifolium	Maple-leaved viburnum	38,1	79,8
Circaea quadrisulcata	Enchanter's nightshade	23	79
Ranunculus abortivus	Small-flowered crowfoot	4	61
Conopholis americana	Squawroot	.	61
Podophyllum peltatum	Mayapple	4	54
Ribes cynosbati	Prickly gooseberry	.	50
Arisaema atrorubens	Jack-in-the-pulpit	4	46

		AArL	ATiDe-Ha
Apocynum andro.	Spreading dogbane	64	4
Potentilla simplex	Common cinquefoil	61	12
Pteridium aquilinum	Braken fern	43,6	15,1
Polygonatum pubescens	Hairy solomon's seal	32	81
Hamamelis virginiana	Witch hazel	25,1	77,10
Dioscorea villosa	Wild yam root	14	65
Smilax tamnoides	Bristly greenbrier	11	62
Dryopteris spinulosa	Spinulose shield fern	11	54
Sanguinaria canadensis	Bloodroot	11	54
Adiantum pedatum	Maidenhair fern	7	50

		AArL	ATiDe-As
Arisaema atrorubens	Jack-in-the-pulpit	46	94
Actaea spp.	Baneberries	11	71
Dioscorea villosa	Wild yam root	14	68
Adiantum pedatum	Maidenhair fern	7	65
Thalictrum dioicum	Early meadow rue	21	52
Caulophyllum thal.	Blue cohosh	7	45
Panax quinquefolius	Ginseng	4	42
Sanguinaria canadensis	Bloodroot	11	42
Amelanchier spp.	Juneberry	82	19
Apocynum andro.	Spreading dogbane	64	10
Potentilla simplex	Common cinquefoil	61	10
Lysimachia quadrifolia	Whorled loosestrife	54	10
Antennaria neglecta	Field pussytoes	50,10	13,1
Pteridium aquilinum	Braken fern	43,6	16,1

		ATiDe-Ha	ATiCa-AI
Amelanchier spp.	Juneberry	81	21
Desmodium glutinosum	Pointed-leaved tick trefoil	73	25
Aster macrophyllus	Large-leaved aster	62	33
Desmodium nudiflorum	Naked-flowered tick trefoil	62	4
Actaea spp.	Baneberries	38	92

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Caulophyllum thal.	Blue cohosh	27	92
Athyrium filix-femina	Lady fern	38	83
Hepatica acutiloba	Sharp-lobed hepatica	23	75
Mitella diphylla	Miterwort	8	58
Allium tricoccum	Wild leek	4	54
Hydrophyllum virgin.	Virginia waterleaf	.	50

		ATiDe-As	ATiCa-AI
Desmodium glutinosum	Pointed-leaved tick trefoil	84,4	25,1
Desmodium nudiflorum	Naked-flowered tick trefoil	58	4
Caulophyllum thal.	Blue cohosh	45	92
Sanguinaria canadensis	Bloodroot	42	88
Hepatica acutiloba	Sharp-lobed hepatica	10	75
Mitella diphylla	Miterwort	6	58
Allium tricoccum	Wild leek	3	54
Hydrophyllum virgin.	Virginia waterleaf	13	50
Hamamelis virginiana	Witch hazel	13,1	46,15

		ATiDe-As	ATTr
Geranium maculatum	Wild geranium	94	.
Amphicarpa bracteata	Hog peanut	90	.
Desmodium glutinosum	Pointed-leaved tick trefoil	84	.
Phryma leptostachya	Lopseed	81	25
Dioscorea villosa	Wild yam root	68	.
Desmodium nudiflorum	Naked-flowered tick trefoil	58	.
Viola pubescens	Downy yellow violet	58	.
Botrychium virginianum	Rattlesnake fern	45	.
Panax quinquefolius	Ginseng	42	.
Athyrium filix-femina	Lady fern	39,2	100,17
Maianthemum canadense	Wild lily-of-the-valley	16	100
Osmunda claytoniana	Interrupted fern	29	75
Hamamelis virginiana	Witch hazel	13,1	75,6
Sambucus pubens	Red-berried elder	6	75
Streptopus roseus	Rosey twisted stalk	6	75
Symplocarpus foetidus	Skunk cabbage	3	75
Lycopodium lucidulum	Shining club-moss	.	75
Mitchella repens	Partridgeberry	.	75
Trientalis borealis	Starflower	.	50
Tsuga canadensis	Eastern hemlock	.	50

		ArDe-V	ATiDe-Ha
Vaccinium angust.	Low sweet blueberry	85	12
Pteridium aquilinum	Braken fern	85	15
Corylus americana	Hazel-nut	80	23
Aralia nudicaulis	Wild sarsaparilla	76	38
Diervilla lonicera	Bush honeysuckle	71	8
Cornus racemosa	Gray dogwood	66	4
Lathyrus ochroleucus	Pale vetchling	61	8
Viburnum acerifolium	Maple-leaved viburnum	38,1	92,9
Ranunculus abortivus	Small-flowered crowfoot	4	85
Polygonatum pubescens	Hairy solomon's seal	28	81
Anemone quinquefolia	Wood anemone	38	77
Circaea quadrisulcata	Enchanter's nightshade	23	77
Hamamelis virginiana	Witch hazel	4,1	77,10
Viola pubescens	Downy yellow violet	4	73
Dioscorea villosa	Wild yam root	9	65
Smilax tamnoides	Bristly greenbrier	23	62
Podophyllum peltatum	Mayapple	4	54

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		ArDe-V	ATiDe-Ha
<i>Sanguinaria canadensis</i>	Bloodroot	9	54
<i>Adiantum pedatum</i>	Maidenhair fern	9	50
<i>Botrychium virginianum</i>	Rattlesnake fern	4	50
<i>Ribes cynosbati</i>	Prickly gooseberry	.	50
<i>Thalictrum dioicum</i>	Early meadow rue	19	46
<i>Panax quinquefolius</i>	Ginseng	.	31

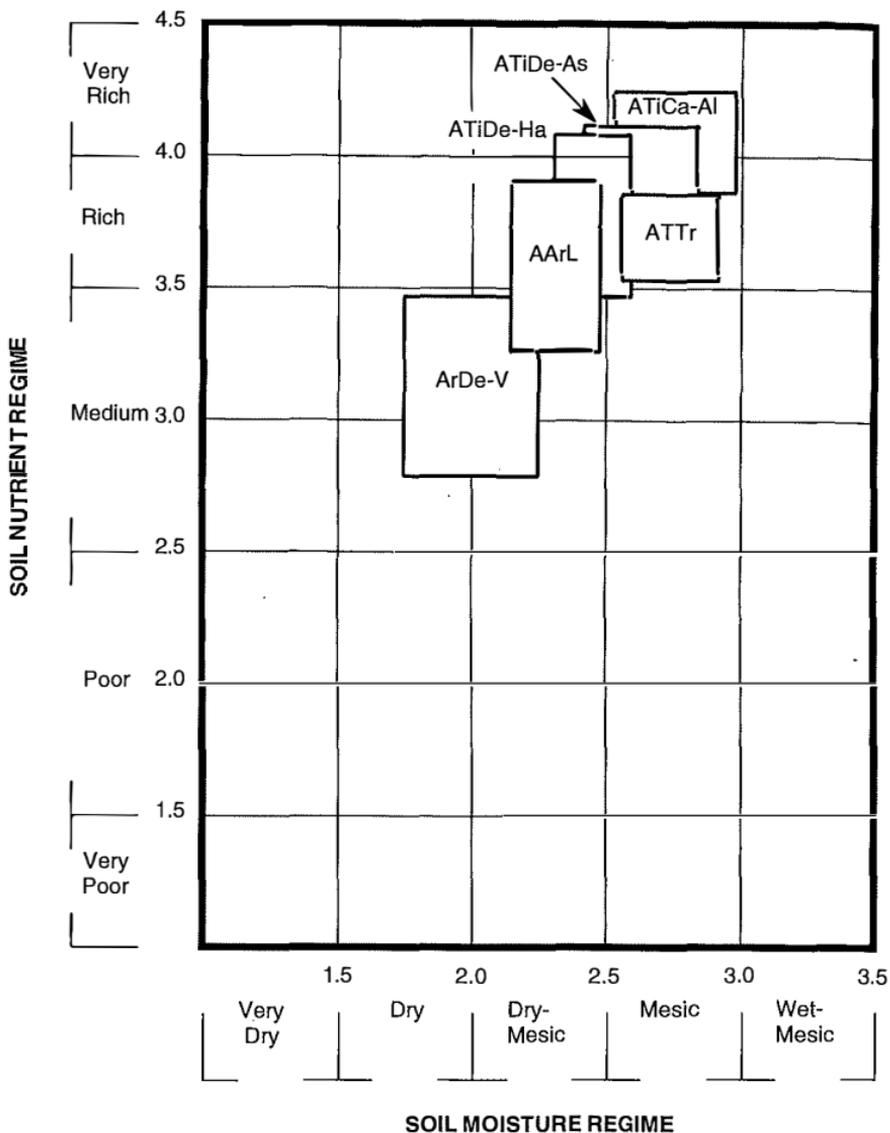
		AARL	ATiCa-AI
<i>Acer rubrum</i>	Red maple	100	38
<i>Desmodium glutinosum</i>	Pointed-leaved tick trefoil	89,5	25,1
<i>Desmodium nudiflorum</i>	Naked-flowered tick trefoil	86,4	4,1
<i>Apocynum andro.</i>	Spreading dogbane	64	.
<i>Potentilla simplex</i>	Common cinquefoil	61	8
<i>Vitis riparia</i>	Riverbank grape	61	13
<i>Lysimachia quadrifolia</i>	Whorled loosestrife	54	.
<i>Pteridium aquilinum</i>	Braken fern	43	.
<i>Rhus radicans</i>	Poison ivy	43	8
<i>Polygonatum pubescens</i>	Hairy solomon's seal	32	88
<i>Viola pubescens</i>	Downy yellow violet	39	88
<i>Arisaema atrorubens</i>	Jack-in-the-pulpit	46	79
<i>Uvularia grandiflora</i>	Large-flowered bellwort	32	71
<i>Solidago flexicaulis</i>	Zigzag goldenrod	36	67
<i>Trillium spp.</i>	Trilliums	.	63

		ATiDe-Ha	ATiDe-As
<i>Ranunculus abortivus</i>	Small-flowered crowfoot	85	45
<i>Amelanchier spp.</i>	Juneberry	81	19
<i>Hamamelis virginiana</i>	Witch hazel	77,10	13,1
<i>Prenanthes alba</i>	White lettuce	62	29
<i>Smilax tamnoides</i>	Bristly greenbrier	62	29
<i>Dryopteris spinulosa</i>	Spinulose shield fern	54	29
<i>Parthenocissus quinq.</i>	Virginia creeper	73,2	97,12
<i>Actaea spp.</i>	Baneberries	38	71
<i>Vitis riparia</i>	Riverbank grape	12	55
<i>Galium aparine</i>	Cleavers	12	45

		ATiDe-Ha	ATTr
<i>Viburnum acerifolium</i>	Maple-leaved viburnum	92,9	50,1
<i>Geranium maculatum</i>	Wild geranium	77	.
<i>Desmodium glutinosum</i>	Pointed-leaved tick trefoil	73	.
<i>Viola pubescens</i>	Downy yellow violet	73	.
<i>Amphicarpa bracteata</i>	Hog peanut	69	.
<i>Desmodium nudiflorum</i>	Naked-flowered tick trefoil	62	.
<i>Maianthemum canadense</i>	Wild lily-of-the-valley	15	100
<i>Lycopodium lucidulum</i>	Shining club-moss	15	75
<i>Streptopus roseus</i>	Rosey twisted stalk	8	75
<i>Mitchella repens</i>	Partridgeberry	4	75
<i>Sambucus pubens</i>	Red-berried elder	.	75
<i>Symplocarpus foetidus</i>	Skunk cabbage	.	75
<i>Circaea alpina</i>	Dwarf enchanter's nightshade	.	50

		ATiCa-AI	ATTr
<i>Geranium maculatum</i>	Wild geranium	88	.
<i>Viola pubescens</i>	Downy yellow violet	88	.
<i>Botrychium virginianum</i>	Rattlesnake fern	71	.
<i>Amphicarpa bracteata</i>	Hog peanut	63	.
<i>Smilacina racemosa</i>	False solomon's seal	63	.
<i>Allium tricoccum</i>	Wild leek	54	.

Relationship of Habitat Types to Soil Moisture and Nutrient Regimes in Baraboo Hills Section



ArDe-V

Acer rubrum/*Desmodium* habitat type, *Vaccinium* variant (Red maple/Pointed-leaf tick trefoil-Blueberry variant)

Distribution:

In northern and western parts of Habitat type Region 7 and throughout Region 6. Also scattered in other counties of Natural Subdivision 6c.

Similar types: PVCr

Landform and soils:

Rolling to hilly topography with sandstone and sometimes dolomitic bedrock. Soils are sandy loam to loam (typical example: Hixton loam). This type represents a distinct **transition between dry and dry-mesic sites**.

Vegetation:

Major forest cover types: *White oak* and *red maple* are the most common dominants in stands that were sampled, but *red oak* is sometimes present. *Pin oak* or *black oak* are much less common than they are on **PVCr** type. *White pine* is often present.

Shrub and small tree layer: This layer is usually well represented. Major species in decreasing order of average coverage are: *Hazel*, *blackberries* and *raspberries*, *serviceberry*, *black cherry*, *gray dogwood* and *bush honeysuckle*. *Red maple* saplings often dominate this layer.

Ground flora characteristics: Number of species and total herb coverage is higher than on other dry types of this region. *Blueberry* occurs here

with small coverage and helps to distinguish **ArDe-V** from **ArCi** and other dry-mesic and mesic types. Species that best distinguishes this type from drier types is *pointed-leaf tick trefoil*. Other diagnostic species with lower constancies are *sweet cicely*, *wild geranium* and *hog peanut*. Best represented species are *bracken fern*, *big-leaf aster*, *tick trefoil*, *wild sarsaparilla* and *Virginia creeper*.

Disturbance and succession: Pre-settlement fire regime favored development of oak communities. *Red oak* is not reproducing adequately in current stands even when *red oak* is dominant in the overstory. *White oak*, however, shows some ability to persist. The most successfully reproducing species is *red maple*. Based on understory composition and soil characteristics we conclude that *sugar maple* is not a potential climax dominant on this type. *Red maple* is the most shade tolerant species that is well adapted to these sites and is presumed to be climax. It is also possible that *white pine* can again become a permanent member of communities on this type once it can be established as a seed source. Competitive relationship between *white pine* and *red maple* on this type has not been established, however, it appears that under a disturbance regime of moderate fire frequency the two species would co-exist.

ArDe-V

Understory species in order of decreasing constancy, with average coverage.

Scientific name	Common name	Constancy %	Coverage %
Herbs			
Sedges spp.	Sedges	95	0.63
<i>Desmodium glutinosum</i>	Pointed-leaved tick trefoil	90	2.18
<i>Pteridium aquilinum</i>	Braken fern	85	6.31
<i>Aralia nudicaulis</i>	Wild sarsaparilla	76	1.13
<i>Smilacina racemosa</i>	False solomon's seal	71	0.67
<i>Geranium maculatum</i>	Wild geranium	71	0.67
<i>Parthenocissus quinquefolia</i>	Virginia creeper	66	1.89
<i>Amphicarpa bracteata</i>	Hog peanut	61	0.50
<i>Lathyrus ochroleucus</i>	Pale vetchling	61	0.50
<i>Osmorhiza claytoni</i>	Sweet cicely	57	0.50
<i>Aster macrophyllus</i>	Large-leaved aster	57	4.25
<i>Uvularia sessilifolia</i>	Sessile-leaved bellwort	57	1.92
<i>Lysimachia quadrifolia</i>	Whorled loosestrife	57	0.50
<i>Desmodium nudiflorum</i>	Naked-flowered tick trefoil	52	2.27
<i>Goodyera pubescens</i>	Downy rattlesnake plantain	47	0.50
Grasses spp.	Grasses	47	0.50
<i>Pyrola</i> spp.	Pyrolas	47	0.50
<i>Galium triflorum</i>	Sweet-scented bedstraw	42	0.50
<i>Dryopteris spinulosa</i>	Spinulose shield fern	42	0.50
<i>Smilax herbacea</i>	Carrion flower	38	0.50
<i>Apocynum androsaemifolium</i>	Spreading dogbane	38	0.81
<i>Maianthemum canadense</i>	Wild lily-of-the-valley	38	0.50
<i>Anemone quinquefolia</i>	Wood anemone	38	0.50
<i>Potentilla simplex</i>	Common cinquefoil	33	0.50
<i>Fragaria vesca</i>	Wood strawberry	33	0.50
<i>Asclepias</i> spp.	Milkweeds	33	0.50
<i>Solidago</i> spp.	Goldenrods	33	0.50
<i>Phryma leptostachya</i>	Lopseed	33	0.50
<i>Osmunda claytoniana</i>	Interrupted fern	28	1.33
<i>Hepatica americana</i>	Round-lobed hepatica	28	0.50
<i>Polygonatum pubescens</i>	Hairy solomon's seal	28	0.50
<i>Vitis riparia</i>	Riverbank grape	28	0.50
<i>Viola</i> spp.	Violets	23	0.50
<i>Circaea quadrisulcata</i>	Enchanter's nightshade	23	0.50
<i>Rhus radicans</i>	Poison ivy	23	0.50
<i>Uvularia grandiflora</i>	Large-flowered bellwort	23	0.50
<i>Smilax tamnoides</i>	Bristly greenbrier	23	0.50
<i>Sanicula marilandica</i>	Black snakeroot	23	0.50
Shrubs			
<i>Rubus</i> spp.	Blackberries/raspberries	100	3.79
<i>Vaccinium angustifolium</i>	Low sweet blueberry	85	0.50
<i>Amelanchier</i> spp.	Juneberry	85	4.44
<i>Corylus americana</i>	Hazel-nut	80	7.50
<i>Prunus virginiana</i>	Chokecherry	80	0.65
<i>Diervilla lonicera</i>	Bush honeysuckle	71	0.83

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Scientific name	Common name	Constancy %	Coverage %
<i>Cornus racemosa</i>	Gray dogwood	66	1.89
<i>Rosa</i> spp.	Roses	66	0.50
<i>Gaylussacia baccata</i>	Black huckleberry	47	0.75
<i>Viburnum acerifolium</i>	Maple-leaved viburnum	38	0.81
<i>Viburnum rafinesquianum</i>	Downy arrowwood	28	0.92
<i>Ilex verticillata</i>	Winterberry	23	1.00
<i>Ribes</i> spp.	Gooseberries	23	0.50
Tree Seedlings			
<i>Prunus serotina</i>	Black cherry	95	1.38
<i>Acer rubrum</i>	Red maple	95	1.13
<i>Quercus alba</i>	White oak	80	0.94
<i>Quercus velutina</i>	Black oak	38	0.50
<i>Quercus rubra</i>	Northern red oak	38	0.50
<i>Carya ovata</i>	Shagbark hickory	33	0.86
<i>Populus grandidentata</i>	Bigtooth aspen	33	0.50
<i>Carya cordiformis</i>	Bitternut hickory	23	0.50
<i>Ulmus</i> spp.	Elms	23	0.50
<i>Crataegus</i> spp.	Hawthorns	28	0.50

AARL

Acer saccharum-*Acer rubrum*/*Lysimachia quadrifolia* (Sugar maple-Red maple/Whorled loosestrife)

Distribution:

Observed almost exclusively on the western, unglaciated portion of Baraboo Range.

Similar types: ATiDe, ArCi-Ph

Landform and soils:

This type is found on a great variety of combinations of soils and landforms. The common characteristic of all sites in this group is a **dry-mesic** condition. Most often this is due to sandy or shallow soils. If soil is silt loam it is always shallow. Also S and W aspects and upper slope positions are more common than other landscape positions.

Vegetation:

Common forest cover types: *Red oak*, *white oak* and *red maple* predominate. *Shagbark hickory*, *black cherry* and *ironwood* are frequent associates. Also present may be *big-tooth aspen*, *white pine* and less frequently, the mesic hardwoods.

Shrub and small tree layer: The following shrubs are best represented: *Maple-leaf viburnum*, *black cherry*, *blackberries* and *serviceberry*. *Red maple* and *ironwood* are the most common saplings.

Ground flora characteristics:

The best represented ground species are those typical of dry-mesic sites, e.g.: *Hog peanut*, *tick trefoil* (both pointed-leaf and naked-flowered) and *riverbank grape*. Also characteristic, but with lower constancy values are: *whorled loosestrife*, *dogbane*, *bracken fern*, *pussytoes*, and *big-leaf aster*.

Disturbance and succession:

Floristic composition of this plant association reflects both the relatively dry conditions, and also frequent disturbance. All tree species mentioned above under "common forest cover types" are reproducing to some extent on these dry-mesic sites. Under current climatic conditions and in the absence of fire, *red maple* and *ironwood* appear to be on their way to replacing current oak stands. However, it appears that in time *sugar maple*, *white ash* and *basswood* may become more important. We named this association *Acer saccharum*-*A. rubrum* community type (instead of *Acer saccharum* habitat type), because the composition of potential climax communities on this site type is uncertain.

AArL

Understory species in order of decreasing constancy, with average coverage.

Scientific name	Common name	Constancy Coverage	
		%	%
Herbs			
<i>Geranium maculatum</i>	Wild geranium	100	0.83
<i>Desmodium glutinosum</i>	Pointed-leaved tick trefoil	89	4.97
<i>Desmodium nudiflorum</i>	Naked-flowered tick trefoil	86	4.43
<i>Amphicarpa bracteata</i>	Hog peanut	82	3.20
<i>Circaea quadrisulcata</i>	Enchanter's nightshade	79	0.54
<i>Parthenocissus quinq.</i>	Virginia creeper	79	0.98
<i>Anemone quinquefolia</i>	Wood anemone	68	0.36
<i>Apocynum androsaemifolium</i>	Spreading dogbane	64	0.64
<i>Aster macrophyllus</i>	Large-leaved aster	61	6.51
<i>Conopholis americana</i>	Squawroot	61	0.52
<i>Osmorhiza claytoni</i>	Sweet cicely	61	0.73
<i>Potentilla simplex</i>	Common cinquefoil	61	0.27
<i>Ranunculus abortivus</i>	Small-flowered crowfoot	61	0.32
<i>Vitis riparia</i>	Riverbank grape	61	2.11
<i>Prenanthes alba</i>	White lettuce	57	0.13
<i>Smilacina racemosa</i>	False solomon's seal	57	0.41
<i>Lysimachia quadrifolia</i>	Whorled loosestrife	54	0.65
<i>Podophyllum peltatum</i>	Mayapple	54	1.61
<i>Antennaria neglecta</i>	Field pussytoes	50	10.12
<i>Arisaema atrorubens</i>	Jack-in-the-pulpit	46	0.25
<i>Pteridium aquilinum</i>	Braken fern	43	5.67
<i>Rhus radicans</i>	Poison ivy	43	2.15
Grasses spp.	Grasses	39	0.23
<i>Viola pubescens</i>	Downy yellow violet	39	0.23
<i>Solidago flexicaulis</i>	Zigzag goldenrod	36	0.25
<i>Aralia nudicaulis</i>	Wild sarsaparilla	32	0.15
<i>Galium aparine</i>	Cleavers	32	0.58
<i>Polygonatum pubescens</i>	Hairy solomon's seal	32	0.32
<i>Uvularia grandiflora</i>	Large-flowered bellwort	32	0.26
<i>Asclepias exaltata</i>	Poke milkweed	29	0.65
<i>Botrychium virginianum</i>	Rattlesnake fern	29	0.16
<i>Solidago ulmifolia</i>	Elm-leaved goldenrod	25	0.80
<i>Aster lateriflorus</i>	Calico or starved aster	21	0.66
<i>Galium concinnum</i>	Shining bedstraw	21	1.23
<i>Pyrola</i> spp.	Pyrolas	21	2.58
<i>Solidago</i> spp.	Goldenrods	21	0.26
<i>Thalictrum dioicum</i>	Early meadow rue	21	0.18
<i>Phryma leptostachya</i>	Lopseed	82	0.61
Shrubs			
<i>Amelanchier</i> spp.	Juneberry	82	1.09
<i>Rubus</i> spp.	Blackberries/raspberries	82	4.20
<i>Prunus virginiana</i>	Chokecherry	79	1.31
<i>Viburnum acerifolium</i>	Maple-leaved viburnum	79	8.25
<i>Rosa</i> spp.	Roses	61	0.24
<i>Corylus americana</i>	Hazel-nut	50	3.30
<i>Ribes cynosbati</i>	Prickly gooseberry	50	0.90

Scientific name	Common name	Constancy %	Coverage %
<i>Cornus alternifolia</i>	Alternate-leaved dogwood	39	1.54
<i>Viburnum rafinesquianum</i>	Downy arrowwood	36	4.39
<i>Xanthoxylum americanum</i>	Prickly ash	32	2.13
<i>Diervilla lonicera</i>	Bush honeysuckle	25	2.30
<i>Hamamelis virginiana</i>	Witch hazel	25	1.00
<i>Lonicera canadensis</i>	American fly honeysuckle	25	0.24
Tree Seedlings			
<i>Acer rubrum</i>	Red maple	100	2.41
<i>Prunus serotina</i>	Black cherry	100	2.45
<i>Quercus rubra</i>	Northern red oak	100	1.28
<i>Fraxinus americana</i>	White ash	93	6.72
<i>Quercus alba</i>	White oak	86	0.99
<i>Carya ovata</i>	Shagbark hickory	82	0.90
<i>Carya cordiformis</i>	Bitternut hickory	79	1.22
<i>Ulmus</i> spp.	Elms	75	0.24
<i>Ostrya virginiana</i>	Ironwood	68	3.70
<i>Acer saccharum</i>	Sugar maple	46	1.51
<i>Populus grandidentata</i>	Bigtooth aspen	46	0.51
<i>Crataegus</i> spp.	Hawthorns	39	0.28
<i>Tilia americana</i>	Basswood	32	0.15
<i>Pinus strobus</i>	White pine	21	0.35

ATiDe-Ha and ATiDe-As

Acer saccharum-Tilia/Desmodium habitat type,

Hamamelis variant

Sugar maple-Basswood/Tick trefoil-Witch hazel variant
and *Arisaema* (Jack-in-the pulpit) variant

Distribution:

Throughout Baraboo Hills. The *Hamamelis* variant is more prevalent in the western, un-glaciated portion and *Arisaema* variant in the eastern glaciated section. Divisions 6a and 5c (Natural Divisions Map).

Similar types: ATiDe (Region 7) and ATiFrVb (Region 10).

Landform and soils:

Silt loams of varying depth on many topographic positions. Vegetation reflects **dry-mesic, nutrient rich** conditions for the *Hamamelis* variant and **mesic to dry-mesic, nutrient rich** for the *Arisaema* variant.

Vegetation:

Common forest cover types: Any combination of *red oak*, *white oak*, *sugar maple* usually accounts for majority of canopy coverage. *Basswood* and *white ash* are present with much lower frequencies. *Oaks* usually dominate the largest diameter classes and *maples* the smaller. On the *Arisaema* variant red maple tends to be somewhat better represented than is *sugar maple*.

Shrub and small tree layer: This layer is somewhat less well developed than it is on other dry-mesic sites. However, the *Hamamelis* variant generally has a strong representation of *witch hazel* or *maple-leaf viburnum*. (Only the latter is common on the *Arisaema* variant). The only other commonly present shrubs are *black cherry*, *choke cherry* and *serviceberry* (on the *Arisaema* variant only). *Red maple* and *ironwood* (*Ostrya*) can also be well repre-

sented. *Wild currants* and *gooseberries* are present but generally not abundant.

Ground flora characteristics: With the exception of *Virginia creeper* on the *Arisaema* variant, herb layer is rather sparse. Species with highest presence percentages on both variants are: *Jack-in-the-pulpit*, *enchanter's nightshade*, *wild geranium*, *tick trefoil*, *hog peanut* and *sweet cicely*. Other floristic differences between the two variants are shown in the comparison tables accompanying the key.

Disturbance and succession: The complex topography of the Baraboo region strongly affected fire disturbance in presettlement time as well as land use pattern following the settlement. Thus, great differences in composition and age structure are found among current forest communities. However, definite successional trends are evident everywhere. Depending on the seed source only three species represent the vast majority of advance regeneration. These are: *Red maple*, *sugar maple* and *ironwood*. *Ironwood* is somewhat more prominent on the *Hamamelis* variant. *Basswood*, *white ash* and *bitternut hickory* saplings each occurred on about 25 to 35 percent of sampled stands. The *Arisaema* variant tends to have a greater number of species represented in the sapling layer than does the *Hamamelis* variant. *Red maple* and *ironwood* usually invade oak stands ahead of *sugar maple*. It appears that these two species will dominate the stand in the future because oak reproduction is very sparse or nonexistent. However, once the *sugar maple* seed source becomes well established this species gradually assumes dominance.

ATiDe-Ha

Understory species in order of decreasing constancy, with average coverage.

Scientific name	Common name	Constancy Coverage	
		%	%
Herbs			
Ranunculus abortivus	Small-flowered crowfoot	85	0.48
Arisaema atrorubens	Jack-in-the-pulpit	81	0.66
Polygonatum pubescens	Hairy solomon's seal	81	0.66
Anemone quinquefolia	Wood anemone	77	0.45
Circaea quadrisulcata	Enchanter's nightshade	77	0.88
Geranium maculatum	Wild geranium	77	0.98
Desmodium glutinosum	Pointed-leaved tick trefoil	73	1.04
Parthenocissus quinquefolia	Virginia creeper	73	2.43
Viola pubescens	Downy yellow violet	73	0.38
Amphicarpa bracteata	Hog peanut	69	2.06
Dioscorea villosa	Wild yam root	65	0.38
Aster macrophyllus	Large-leaved aster	62	0.98
Desmodium nudiflorum	Naked-flowered tick trefoil	62	1.01
Osmorhiza claytoni	Sweet cicely	62	0.41
Prenanthes alba	White lettuce	62	0.22
Smilax tamnoides	Bristly greenbrier	62	0.25
Uvularia grandiflora	Large-flowered bellwort	58	0.56
Dryopteris spinulosa	Spinulose shield fern	54	1.75
Phryma leptostachya	Lopseed	54	0.27
Podophyllum peltatum	Mayapple	54	0.80
Sanguinaria canadensis	Bloodroot	54	0.62
Smilacina racemosa	False solomon's seal	54	0.35
Adiantum pedatum	Maidenhair fern	50	1.18
Botrychium virginianum	Rattlesnake fern	50	0.17
Thalictrum dioicum	Early meadow rue	46	0.95
Galium concinnum	Shining bedstraw	42	0.45
Grasses spp.	Grasses	42	1.02
Monotropa uniflora	Indian pipe	42	0.14
Actaea spp.	Baneberries	38	0.25
Aralia nudicaulis	Wild sarsaparilla	38	0.68
Athyrium filix-femina	Lady fern	38	1.36
Conopholis americana	Squawroot	38	0.69
Uvularia sessilifolia	Sessile-leaved bellwort	38	0.35
Goodyera pubescens	Downy rattlesnake plantain	31	0.16
Osmunda claytoniana	Interrupted fern	31	2.02
Panax quinquefolius	Ginseng	31	0.22
Caulophyllum thalictroides	Blue cohosh	27	0.24
Solidago flexicaulis	Zigzag goldenrod	27	0.31
Asclepias exaltata	Poke milkweed	23	0.10
Hepatica acutiloba	Sharp-lobed hepatica	23	3.31
Pyrola elliptica	Shinleaf	23	0.18
Shrubs			
Amelanchier spp.	Juneberry	81	0.33
Prunus virginiana	Chokecherry	81	1.04

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Scientific name	Common name	Constancy Coverage	
		%	%
<i>Hamamelis virginiana</i>	Witch hazel	77	9.51
<i>Rubus</i> spp.	Blackberries/raspberries	54	0.30
<i>Ribes cynosbati</i>	Prickly gooseberry	50	0.63
<i>Cornus alternifolia</i>	Alternate-leaved dogwood	35	0.47
<i>Crataegus</i> spp.	Hawthorns	35	0.15
<i>Viburnum rafinesquianum</i>	Downy arrowwood	35	0.58
<i>Corylus americana</i>	Hazel-nut	23	1.23
<i>Lonicera dioica</i>	Smooth-leaved honeysuckle	23	0.10
Tree Seedlings			
<i>Prunus serotina</i>	Black cherry	100	0.66
<i>Quercus rubra</i>	Northern red oak	100	0.65
<i>Carya cordiformis</i>	Bitternut hickory	96	0.74
<i>Acer rubrum</i>	Red maple	92	0.63
<i>Fraxinus americana</i>	White ash	92	2.97
<i>Viburnum acerifolium</i>	Maple-leaved viburnum	92	8.67
<i>Acer saccharum</i>	Sugar maple	88	10.90
<i>Ostrya virginiana</i>	Ironwood	85	2.16
<i>Tilia americana</i>	Basswood	81	0.44
<i>Carya ovata</i>	Shagbark hickory	73	0.89
<i>Ulmus</i> spp	Elms	69	0.32
<i>Populus grandidentata</i>	Bigtooth aspen	54	0.35
<i>Quercus alba</i>	White oak	50	0.36
<i>Carpinus caroliniana</i>	American hornbeam	38	2.56

ATiDe-As

Understory species in order of decreasing constancy, with average coverage.

Scientific name	Common name	Constancy Coverage	
		%	%
Herbs			
<i>Circaea quadrisculcata</i>	Enchanter's nightshade	97	2.88
<i>Parthenocissus quinquefolia</i>	Virginia creeper	97	12.23
<i>Arisaema atrorubens</i>	Jack-in-the-pulpit	94	1.09
<i>Geranium maculatum</i>	Wild geranium	94	4.50
<i>Amphicarpa bracteata</i>	Hog peanut	90	1.82
<i>Desmodium glutinosum</i>	Pointed-leaved tick trefoil	84	4.12
<i>Phryma leptostachya</i>	Lopseed	81	0.67
<i>Actaea</i> spp.	Baneberries	71	0.58
<i>Osmorhiza claytoni</i>	Sweet cicely	71	1.14
<i>Podophyllum peltatum</i>	Mayapple	71	3.55
<i>Dioscorea villosa</i>	Wild yam root	68	0.47
<i>Uvularia grandiflora</i>	Large-flowered bellwort	68	0.56
<i>Adiantum pedatum</i>	Maidenhair fern	65	0.90
<i>Polygonatum pubescens</i>	Hairy solomon's seal	65	0.61
<i>Anemone quinquefolia</i>	Wood anemone	61	0.54
<i>Desmodium nudiflorum</i>	Naked-flowered tick trefoil	58	1.10
<i>Viola pubescens</i>	Downy yellow violet	58	1.23
<i>Vitis riparia</i>	Riverbank grape	55	0.61
<i>Conopholis americana</i>	Squawroot	52	0.40
<i>Thalictrum dioicum</i>	Early meadow rue	52	2.18
<i>Aralia nudicaulis</i>	Wild sarsaparilla	45	1.41
<i>Botrychium virginianum</i>	Rattlesnake fern	45	0.27
<i>Caulophyllum thalictroides</i>	Blue cohosh	45	0.82
<i>Galium aparine</i>	Cleavers	45	0.93
<i>Ranunculus abortivus</i>	Small-flowered crowfoot	45	0.31
<i>Rhus radicans</i>	Poison ivy	45	0.86
<i>Smilacina racemosa</i>	False solomon's seal	45	0.42
Grasses spp.	Grasses	42	0.88
<i>Panax quinquefolius</i>	Ginseng	42	0.17
<i>Sanguinaria canadensis</i>	Bloodroot	42	0.51
<i>Aster macrophyllus</i>	Large-leaved aster	39	0.86
<i>Athyrium filix-femina</i>	Lady fern	39	2.23
<i>Cryptotaenia canadensis</i>	Honewort	35	2.20
<i>Sanicula gregaria</i>	Clustered snakeroot	35	0.99
<i>Viola pennsylvanica</i>	Smooth yellow violet	35	1.24
<i>Dryopteris spinulosa</i>	Spinulose shield fern	29	0.96
<i>Galium triflorum</i>	Sweet-scented bedstraw	29	0.91
<i>Geum canadense</i>	White avens	29	0.26
<i>Osmunda claytoniana</i>	Interrupted fern	29	4.22
<i>Prenanthes alba</i>	White lettuce	29	0.10
<i>Ranunculus recurvatus</i>	Hooked crowfoot	29	0.58
<i>Smilax tamnoides</i>	Bristly greenbrier	29	0.32
<i>Solidago flexicaulis</i>	Zigzag goldenrod	29	0.32
<i>Galium asprellum</i>	Cleavers	26	0.35
<i>Agrimonia gryposepala</i>	Agrimony	23	0.10
<i>Smilax herbacea</i>	Carrion flower	23	0.10

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Scientific name	Common name	Constancy Coverage	
		%	%
Shrubs			
<i>Viburnum acerifolium</i>	Maple-leaved viburnum	84	5.26
<i>Ribes cynosbati</i>	Prickly gooseberry	77	0.97
<i>Rubus</i> spp.	Blackberries/raspberries	77	1.99
<i>Prunus virginiana</i>	Chokecherry	68	2.23
<i>Cornus alternifolia</i>	Alternate-leaved dogwood	52	0.43
<i>Corylus americana</i>	Hazel-nut	39	0.59
<i>Rosa</i> spp.	Roses	29	0.15
<i>Xanthoxylum americanum</i>	Prickly ash	29	0.37
<i>Viburnum lentago</i>	Nannyberry	23	2.71
<i>Viburnum rafinesquianum</i>	Downy arrowwood	23	0.17
Tree Seedlings			
<i>Carya cordiformis</i>	Bitternut hickory	94	0.81
<i>Prunus serotina</i>	Black cherry	94	2.87
<i>Fraxinus americana</i>	White ash	84	3.73
<i>Ulmus</i> spp.	Elms	84	2.84
<i>Acer rubrum</i>	Red maple	81	1.60
<i>Quercus rubra</i>	Northern red oak	71	0.25
<i>Tilia americana</i>	Basswood	61	0.48
<i>Acer saccharum</i>	Sugar maple	58	10.21
<i>Ostrya virginiana</i>	Ironwood	48	3.02
<i>Carya ovata</i>	Shagbark hickory	45	0.62
<i>Quercus alba</i>	White oak	42	1.32
<i>Fraxinus pennsylvanic</i>	Green ash	39	3.43
<i>Populus grandidentata</i>	Bigtooth aspen	29	0.15
<i>Juglans cinerea</i>	Butternut	26	0.16
<i>Celtis occidentalis</i>	Hackberry	23	2.44

ATTr

***Acer saccharum-Tsuga/Trientalis* (Sugar maple-Hemlock/Starflower)**

Distribution:

This type represents the relic northern forest found only in a few location in the unglaciated part of the Baraboo Range.

Similar types: ATiCa-Al

Landform and soils:

Cool protected ravines. Other characteristics not different from ATiCa-Al type.

Vegetation:

Common forest cover types:

All of these relic stands are dominated by *sugar maple*, but *hemlock* and *yellow birch* are always present. Other associated species are *white pine*, *white ash*, *bitternut hickory*, *basswood* or *red oak*.

Shrub and small tree layer: This layer is not well developed. Best represented are *witch hazel* and saplings of *ironwood* and *red maple*. *Mountain maple*, a typical northern shrub, is sometimes present.

Ground flora characteristics:

this type contains both the species of typically southern affin-

ity and some characteristic members of northern communities. The common southern species include: *Enchanter's nightshade*, *Virginia creeper*, *sweet cicely*, *sharp-lobed hepatica*, *mayapple* and *Virginia waterleaf*. The characteristic northern species, seldom found in other southern communities are: *Partridgeberry*, *starflower*, *shiny clubmoss* (*Lycopodium*), and *oak fern*. Additional species that are much better represented in northern forests include: *Big-leaf aster*, *wild lily-of-the-valley* and *rosey twisted stalk*.

Disturbance and succession:

It is uncertain what kind of disturbance favors hemlock regeneration in this region. At this time *sugar maple* and *yellow birch* are reproducing most successfully, but *hemlock* reproduction is insignificant. Perhaps tip-up mounds created by infrequent severe windstorms, or periodic fire is needed. High white tail deer populations have also been suggested as possible cause for lack of *hemlock* reproduction.

ATTr

Understory species in order of decreasing constancy, with average coverage.

Scientific name	Common name	Constancy	Coverage
		%	%
Herbs			
<i>Anemone quinquefolia</i>	Wood anemone	100	0.35
<i>Arisaema atrorubens</i>	Jack-in-the-pulpit	100	0.35
<i>Athyrium filix-femina</i>	Lady fern	100	17.02
<i>Circaea quadrisulcata</i>	Enchanter's nightshade	100	0.10
<i>Maianthemum canadense</i>	Wild lily-of-the-valley	100	1.67
<i>Osmorhiza claytoni</i>	Sweet cicely	100	0.22
<i>Parthenocissus quinquefolia</i>	Virginia creeper	100	9.57
<i>Polygonatum pubescens</i>	Hairy solomon's seal	100	0.47
<i>Actaea</i> spp.	Baneberries	75	0.27
<i>Aster macrophyllus</i>	Large-leaved aster	75	1.07
<i>Lycopodium lucidulum</i>	Shining club-moss	75	0.27
<i>Mitchella repens</i>	Partridgeberry	75	2.03
<i>Osmunda claytoniana</i>	Interrupted fern	75	2.20
<i>Sanguinaria canadensis</i>	Bloodroot	75	0.27
<i>Streptopus roseus</i>	Rosey twisted stalk	75	0.43
<i>Symplocarpus foetidus</i>	Skunk cabbage	75	0.27
<i>Aralia nudicaulis</i>	Wild sarsaparilla	50	0.10
<i>Caulophyllum thalictroides</i>	Blue cohosh	50	0.35
<i>Circaea alpina</i>	Dwarf enchanter's nightshade	50	0.35
<i>Dryopteris phegopteris</i>	Longbeech fern	50	0.35
<i>Dryopteris spinulosa</i>	Spinulose shield fern	50	0.10
<i>Dryopteris thelypteris</i>	Marsh shield fern	50	0.35
<i>Hepatica acutiloba</i>	Sharp-lobed hepatica	50	0.10
<i>Mitella diphylla</i>	Miterwort	50	0.10
<i>Monotropa uniflora</i>	Indian pipe	50	0.10
<i>Polypodium virginianum</i>	Polypodium virginianum	50	0.35
<i>Smilax herbacea</i>	Carrion flower	50	0.10
<i>Trientalis borealis</i>	Starflower	50	0.35
<i>Trillium</i> spp.	Trilliums	50	0.10
<i>Viola incognita</i>	Large-leaved white violet	50	1.55
<i>Adiantum pedatum</i>	Maidenhair fern	25	3.00
<i>Adlumia fungosa</i>	Climbing fumitory	25	0.10
<i>Aquilegia canadensis</i>	Wild columbine	25	0.10
<i>Aralia racemosa</i>	Spikenard	25	0.10
<i>Cystopteris fragilis</i>	Brittle fern	25	0.10
<i>Dentaria laciniata</i>	Cut-leaved toothwort	25	0.10
<i>Fragaria</i> spp.	Wild strawberries	25	0.10
<i>Goodyera pubescens</i>	Downy rattlesnake plantain	25	0.10
<i>Goodyera</i> spp.	Rattlesnake plantains	25	0.10
<i>Hydrophyllum virginianum</i>	Virginia waterleaf	25	0.10
<i>Lactuca</i> spp.	Wild lettuce	25	0.10
<i>Phryma leptostachya</i>	Lopseed	25	0.10
<i>Pilea pumila</i>	Clearweed or richweed	25	0.10
<i>Podophyllum peltatum</i>	Mayapple	25	0.10
<i>Ranunculus abortivus</i>	Small-flowered crowfoot	25	0.10
<i>Sanicula marilandica</i>	Black snakeroot	25	0.10

Scientific name	Common name	Constancy	Coverage
		%	%
<i>Solidago flexicaulis</i>	Zigzag goldenrod	25	0.60
<i>Thalictrum dioicum</i>	Early meadow rue	25	0.10
<i>Uvularia grandiflora</i>	Large-flowered bellwort	25	0.60
<i>Viola</i> spp.	Violets	25	0.10
<i>Vitis riparia</i>	Riverbank grape	25	0.10
Shrubs			
<i>Hamamelis virginiana</i>	Witch hazel	75	6.03
<i>Sambucus pubens</i>	Red-berried elder	75	0.60
<i>Amelanchier</i> spp.	Juneberry	50	0.10
<i>Diervilla lonicera</i>	Bush honeysuckle	50	0.10
<i>Ribes cynosbati</i>	Prickly gooseberry	50	0.35
<i>Viburnum acerifolium</i>	Maple-leaved viburnum	50	0.10
<i>Acer spicatum</i>	Mountain maple	25	0.60
<i>Prunus virginiana</i>	Chokecherry	25	0.10
<i>Cornus alternifolia</i>	Alternate-leaved dogwood	25	0.10
<i>Corylus cornuta</i>	Beaked hazelnut	25	0.60
<i>Rubus</i> spp.	Blackberries/raspberries	25	0.10
<i>Xanthoxylum americanum</i>	Prickly ash	25	0.10
Tree Seedlings			
<i>Acer saccharum</i>	Sugar maple	100	1.67
<i>Carya cordiformis</i>	Bitternut hickory	100	0.22
<i>Fraxinus americana</i>	White ash	100	0.35
<i>Prunus serotina</i>	Black cherry	100	0.10
<i>Acer rubrum</i>	Red maple	75	5.23
<i>Betula alleghaniensis</i>	Yellow birch	75	5.07
<i>Tilia americana</i>	Basswood	75	0.10
<i>Ostrya virginiana</i>	Ironwood	50	7.55
<i>Quercus rubra</i>	Northern red oak	50	0.35
<i>Tsuga canadensis</i>	Eastern hemlock	50	7.80
<i>Quercus alba</i>	White oak	25	0.10
<i>Pinus strobus</i>	White pine	25	0.10

ATiCa-AI

Acer saccharum-*Tilia*/*Caulophyllum* habitat type, *Allium* variant

(Sugar maple-Basswood/Blue cohosh (Wild leek variant))

Distribution:

The 24 stands representing this type all came from the western, unglaciated part of the Baraboo Range. However, it is possible that the type also exists in the eastern parts where site conditions are similar.

Similar types: ATiCa (Region 7).

Landform and soils:

Primarily on deep soils and on N and E slopes and often on lower slope positions. **Mesic, nutrient rich and very rich** sites.

Vegetation:

Common forest cover types: *Sugar maple* is dominant in most stands. *Basswood*, *bitternut hickory*, and less frequently, *white ash* are principal associates. *Red* and *white oak* are usually represented only in the larger diameter classes. In contrast to dry-mesic types in the same area *red maple* is much less important.

Shrub and small tree layer: This layer is not well developed. Only small coverage of *black cherry*, *choke cherry*, *maple-leaf viburnum* or *gooseberries* is common. The only exception is a relatively high presence of *witch hazel* in some stands. In such cases it is important not to confuse the site with the ATiDe-Ha type.

Ground flora characteristics: As on all mesic habitat types, a number of species with distinct tendency for occurrence on rich, mesic sites is found on this type, although individual constancy values are moderate. Some of these are: *Red baneberry*, *lady fern*, *blue cohosh*, *sharp-lobed hepatica*, *trillium*, *miterwort* and *wild leek*.

It is important to note that the name wild leek (*Allium*) is used only to distinguish the Baraboo variant of ATiCa from the ATiCa type that occurs elsewhere in Region 7. Although wild leek has a constancy value of only 54% on the ATiCa-AI variant it is generally absent on the ATiCa.

The best represented ground layer species are: *Enchanter's nightshade*, *wild geranium*, *Virginia creeper*, *blue cohosh*, *sweet cicely*, *lady fern* and *sharp-lobed hepatica*.

Disturbance and succession: The ATiCa-AI association represents the most stable, self-perpetuating community type in the Baraboo region. It reflects landscapes that for various reasons were not heavily influenced by presettlement fires. *Sugar maple* is the most aggressively reproducing species, but adequate advance regeneration of *basswood*, *white ash*, *bitternut hickory* and *red maple* is generally present to perpetuate mixed composition.

ATiCa-AI

Understory species in order of decreasing constancy, with average coverage.

Scientific name	Common name	Constancy Coverage	
		%	%
Herbs			
Actaea spp.	Baneberries	92	0.57
Caulophyllum thalictroides	Blue cohosh	92	1.69
Circaea quadrisulcata	Enchanter's nightshade	92	2.36
Parthenocissus quinquefolia	Virginia creeper	92	3.08
Geranium maculatum	Wild geranium	88	1.48
Polygonatum pubescens	Hairy solomon's seal	88	0.73
Sanguinaria canadensis	Bloodroot	88	0.85
Viola pubescens	Downy yellow violet	88	0.85
Athyrium filix-femina	Lady fern	83	1.77
Osmorhiza claytoni	Sweet cicely	83	1.36
Ranunculus abortivus	Small-flowered crowfoot	83	0.32
Arisaema atorubens	Jack-in-the-pulpit	79	0.62
Adiantum pedatum	Maidenhair fern	75	0.97
Hepatica acutiloba	Sharp-lobed hepatica	75	3.34
Botrychium virginianum	Rattlesnake fern	75	0.48
Phryma leptostachya	Lopseed	71	0.54
Uvularia grandiflora	Large-flowered bellwort	71	0.91
Solidago flexicaulis	Zigzag goldenrod	67	0.56
Amphicarpa bracteata	Hog peanut	63	0.23
Smilacina racemosa	False solomon's seal	63	0.56
Trillium spp.	Trilliums	63	0.40
Anemone quinquefolia	Wood anemone	58	0.31
Mitella diphylla	Miterwort	58	0.56
Podophyllum peltatum	Mayapple	58	0.97
Allium tricoccum	Wild leek	54	0.41
Thalictrum dioicum	Early meadow rue	54	1.00
Hydrophyllum virginianum	Virginia waterleaf	50	1.03
Dryopteris spinulosa	Spinulose shield fern	46	3.47
Dioscorea villosa	Wild yam root	42	0.40
Cryptotaenia canadensis	Honewort	38	0.49
Galium concinnum	Shining bedstraw	38	2.13
Galium triflorum	Sweet-scented bedstraw	38	0.27
Smilax tamnoides	Bristly greenbrier	38	0.16
Aster macrophyllus	Large-leaved aster	33	0.23
Galium aparine	Cleavers	33	0.35
Grasses spp.	Grasses	33	0.65
Osmunda claytoniana	Interrupted fern	33	2.45
Ranunculus recurvatus	Hooked crowfoot	33	0.22
Maianthemum canadense	Wild lily-of-the-valley	29	0.46
Sanicula gregaria	Clustered snakeroot	29	0.73
Uvularia sessilifolia	Sessile-leaved bellwort	29	0.17
Aralia racemosa	Spikenard	25	0.10
Campanula americana	Tall bellflower	25	0.10
Desmodium glutinosum	Pointed-leaved tick trefoil	25	0.27

continued...

...continued

Scientific name	Common name	Constancy Coverage	
		%	%
<i>Laportea canadensis</i>	Wood nettle	25	13.62
<i>Panax quinquefolius</i>	Ginseng	25	0.18
<i>Sanicula marilandica</i>	Black snakeroot	25	3.23
<i>Viola incognita</i>	Large-leaved white violet	25	0.18
<i>Asarum canadense</i>	Wild ginger	21	3.86
<i>Geum canadense</i>	White avens	21	0.30
<i>Polemonium reptans</i>	Greek valerian	21	0.30
<i>Smilax herbacea</i>	Carrion flower	21	0.20
<i>Streptopus roseus</i>	Rosey twisted stalk	21	0.10
<i>Viola pensylvanica</i>	Smooth yellow violet	21	0.20
Shrubs			
<i>Prunus virginiana</i>	Chokecherry	83	0.37
<i>Ribes cynosbati</i>	Prickly gooseberry	71	0.68
<i>Viburnum acerifolium</i>	Maple-leaved viburnum	71	0.54
<i>Cornus alternifolia</i>	Alternate-leaved dogwood	50	0.18
<i>Rubus</i> spp.	Blackberries/raspberries	50	0.14
<i>Hamamelis virginiana</i>	Witch hazel	46	14.81
<i>Xanthoxylum americanum</i>	Prickly ash	25	0.75
<i>Amelanchier</i> spp.	Juneberry	21	0.10
<i>Sambucus canadensis</i>	Common elder	21	0.10
<i>Sambucus pubens</i>	Red-berried elder	21	0.30
Tree Seedlings			
<i>Carya cordiformis</i>	Bitternut hickory	96	1.93
<i>Acer saccharum</i>	Sugar maple	92	13.37
<i>Fraxinus americana</i>	White ash	83	1.67
<i>Prunus serotina</i>	Black cherry	79	0.18
<i>Ulmus</i> spp.	Elms	75	1.66
<i>Quercus rubra</i>	Northern red oak	58	0.24
<i>Tilia americana</i>	Basswood	50	0.18
<i>Carpinus caroliniana</i>	American hornbeam	42	3.81
<i>Ostrya virginiana</i>	Ironwood	42	0.49
<i>Acer rubrum</i>	Red maple	38	0.16
<i>Carya ovata</i>	Shagbark hickory	33	0.16
<i>Quercus alba</i>	White oak	29	0.51

Occurrence of Tree Species on Habitat Types of the Baraboo Hills Section

Size classes: SE - seedlings; SA - saplings; MT - medium trees (4-10" DBH); LT - large trees (>10" DBH). Numbers are frequency of occurrence: * <10%; 1, 10-25%; 2, 26-50%; 3, 51-75%; 4, 76-100%. Letters are coverage classes: A <5%; B 5-15%; C 16-35%; D >35%.

	ArDe-V				AArL				ATiDe-Ha				ATiDe-As				ATiCa-Al				ATTr			
	SE	SA	MT	LT	SE	SA	MT	LT	SE	SA	MT	LT	SE	SA	MT	LT	SE	SA	MT	LT	SE	SA	MT	LT
Jack pine																								
Bur oak	*	*	*	*																				
Northern pin oak	*	1A	1B	1D									*	*	*									
Trembling aspen					*		*					*	*											
Bigtooth aspen	2A	1A	1A	1D	1A	*	*	2B	1A	1A	2B	1A	*	2B								1B		
Red pine			*	*																				
Black oak	2A	1A	2A	2D			*	*																
Black walnut																							*	
Paper birch		*	*			*	*			*			*	*			*	*	*				1B	
Black ash													*	*			*	*	*					
Northern red oak	2A	1A	2B	2D	1A	1B	3B	4C	2A	*	1B	4D	1A	*	2B	3D	1A	*	2C				2B	
White pine	1A	1B	2A	1C	1A	2B	1B	1B					*	*	1A	1B	*	*	*				2B	
White oak	4A	3B	3A	3B	2A	1B	3B	4C	1A	*	1B	3C	*	*	2B	3C	*		1A	1C			1A	
Bulltongue	*	*	*				*			*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Swamp white oak																								
Shagbark hickory	2A	2B	*		2A	3B	2B	1B	2A	1A	1A	1A	1A	1A	*	1A	1B	1A	*					
Black cherry	4A	4A	1A	*	2A	3A	2A	1A	3A	1A	*	2A	2A	2B	2A	*	*	1A	1A					
Box elder	1A								*				*	*	*									
Hackberry					*							*	1A	*	*	*	*	*	*	*	*	*	*	*
Elms	1A					*							2B	2B	*	*	*	*	*	*	*	*	*	
American elm					1A	*	*								*	*	*	*	*	*	*	*	*	
White ash	1A	1B	*	*	2B	3A	1B		3A	2A	1A	1A	2B	2B	2B	1B	2A	2A	1B	1B	3A	1A	1A	1B
Green ash													1B	*	*	*	*	*	*	*	*	*	*	*
Yellow birch																	*	1B	1B	1C	2B	3A	2B	2C
Bitternut hickory	1A	1A			2A	1A	*	*	3A	2A	1B	2A	2A	1A	*	2A	2A	2B	1B	2A	1A	1A		
Red maple	4A	4C	4B	1A	2A	4B	4C	2B	2A	3B	2C	2C	1A	3C	3C	3C	1A	1B	1C	1B	2B	1A	1A	
American hornbeam	1A	2B							1A	*		*	*	*	*	2B							1A	
Ironwood	*	1B	*		2A	4C	2B		3A	4C	1B	1B	2B	1B	1A	3B	1B				2B	1B	1B	
Basswood	*	1A	*	*	*	1A	*		2A	1A	1A	2B	2A	2B	2B	2C	1A	2A	2B	2B	1A	2A	1A	
Eastern hemlock																	*	*	*	*	2B	1A	3A	3D
American beech																								
Sugar maple	*	1A	1A		1A	2B	1B	*	3B	4B	3C	3C	2B	2C	2C	2C	3B	4C	4C	3D	4A	2B	2B	3D

Understory Species with Potential Diagnostic Value for Distinguishing Among the Habitat Types in the Baraboo Hills Section

Number represent frequency of occurrence classes: * 10-25%; 1, 26-50%; 2, 51-75%; 3, 76-100%. Letters are coverage classes: A<5%; B 6-15%; C>15%.

Scientific Name	Common Name	ArDe-V	ATiDe-Ha		ATTr		
		AArL	ATiDe-As	ATiCa-AI			
Herbs							
<i>Hepatica americana</i>	Round-lobed hepatica	1 A					
<i>Fragaria vesca</i>	Wood strawberry	1 A					
<i>Lathyrus ochroleucus</i>	Pale vetchling	2 A	*				
<i>Uvularia sessilifolia</i>	Sessile-leaved bellwort	2 A	*	1 A	*		1 A
<i>Pteridium aquilinum</i>	Braken fern	3 B	1 B	*	*		
<i>Potentilla simplex</i>	Common cinquefoil	1 A	2 A	*	*		
<i>Apocynum andro.</i>	Spreading dogbane	1 A	2 A		*		
<i>Lysimachia quadrifolia</i>	Whorled loosestrife	2 A	2 A	*	*		
<i>Desmodium nudiflorum</i>	Naked-flowered tick trefoil	2 A	3 A	2 A	2 A		
<i>Desmodium glutinosum</i>	Pointed-leaved tick trefoil	3 A	3 A	2 A	3 A		*
<i>Aralia nudicaulis</i>	Wild sarsaparilla	3 A	1 A	1 A	1 A	1 A	*
<i>Aster macrophyllus</i>	Large-leaved aster	2 A	2 B	2 A	1 A	2 A	1 A
<i>Phryma leptostachya</i>	Lopseed	1 A	3 A	2 A	3 A	*	2 A
<i>Anemone quinquefolia</i>	Wood anemone	1 A	2 A	3 A	2 A	3 A	2 A
<i>Polygonatum pubescens</i>	Hairy solomon's seal	1 A	1 A	3 A	2 A	3 A	3 A
<i>Circaea quadrisulcata</i>	Enchanter's nightshade	*	3 A	3 A	3 A	3 A	3 A
<i>Vitis riparia</i>	Riverbank grape	1 A	2 A	*	2 A	*	*
<i>Maianthemum canadense</i>	Wild lily-of-the-valley	1 A	*	*	*	3 A	1 A
<i>Dryopteris spinulosa</i>	Spinulose shield fern	1 A	*	2 A	1 A	1 A	1 A
<i>Uvularia grandiflora</i>	Large-flowered bellwort	*	1 A	2 A	2 A	*	2 A
<i>Thalictrum dioicum</i>	Early meadow rue	*	*	1 A	2 A	*	2 A
<i>Athyrium filix-femina</i>	Lady fern	*	*	1 A	1 A	3 C	3 A
<i>Geranium maculatum</i>	Wild geranium	2 A	3 A	3 A	3 A		3 A
<i>Amphicarpa bracteata</i>	Hog peanut	2 A	3 A	2 A	3 A		2 A
<i>Smilacina racemosa</i>	False solomon's seal	2 A	2 A	2 A	1 A		2 A
<i>Smilax tamnoides</i>	Bristly greenbrier	*	*	2 A	1 A		1 A
<i>Solidago flexicaulis</i>	Zigzag goldenrod		1 A	1 A	1 A	*	2 A
<i>Hepatica acutiloba</i>	Sharp-lobed hepatica		*	*	*	1 A	2 A
<i>Podophyllum peltatum</i>	Mayapple		2 A	2 A	2 A	*	2 A
<i>Ranunculus abortivus</i>	Small-flowered crowfoot		2 A	3 A	1 A	*	3 A
<i>Arisaema atrorubens</i>	Jack-in-the-pulpit		1 A	3 A	3 A	3 A	3 A
<i>Actaea spp.</i>	Baneberries		*	1 A	2 A	2 A	3 A
<i>Sanguinaria canadensis</i>	Bloodroot		*	2 A	1 A	2 A	3 A
<i>Caulophyllum thal.</i>	Blue cohosh			1 A	1 A	1 A	3 A
<i>Viola pubescens</i>	Downy yellow violet		1 A	2 A	2 A		3 A
<i>Botrychium virginianum</i>	Rattlesnake fern		1 A	1 A	1 A		2 A
<i>Dioscorea villosa</i>	Wild yam root		*	2 A	2 A		1 A
<i>Adiantum pedatum</i>	Maidenhair fern			1 A	2 A	*	2 A
<i>Geum canadense</i>	White avens		*		1 A		*
<i>Cryptotaenia can.</i>	Honewort				1 A		1 A

Scientific Name	Common Name	ArDe-V	ATiDe-Ha		ATTr		
		AARL	ATiDe-As	ATiCa-AI			
<i>Ranunculus recurvatus</i>	Hooked crowfoot			*	1 A	1 A	
<i>Sanicula gregaria</i>	Clustered snakeroot		*		1 A	1 A	
<i>Panax quinquefolius</i>	Ginseng			1 A	1 A	*	
<i>Streptopus roseus</i>	Rosey twisted stalk	*				2 A *	
<i>Mitchella repens</i>	Partridgeberry					2 A	
<i>Lycopodium lucidulum</i>	Shining club-moss			*		2 A	
<i>Trientalis borealis</i>	Starflower	*		*		1 A *	
<i>Symplocarpus foetidus</i>	Skunk cabbage					2 A *	
<i>Hydrophyllum virgin.</i>	Virginia waterleaf				*	* 1 A	
<i>Mitella diphylla</i>	Miterwort					1 A 2 A	
<i>Trillium spp.</i>	Trilliums			*		1 A 2 A	
<i>Allium tricoccum</i>	Wild leek					2 A	
<i>Asarum canadense</i>	Wild ginger					*	
Shrubs							
<i>Vaccinium angustifolium</i>	Low sweet blueberry	3 A		*			
<i>Gaylussacia baccata</i>	Black huckleberry	1 A					
<i>Cornus racemosa</i>	Gray dogwood	2 A	*		*		
<i>Diervilla lonicera</i>	Bush honeysuckle	2 A	*		*	1 A	
<i>Viburnum rafinesquianum</i>	Downy arrowwood	1 A	1 A	1 A	*	*	
<i>Corylus americana</i>	Hazel-nut	3 B	1 A	*	1 A	*	
<i>Amelanchier spp.</i>	Juneberry	3 A	3 A	3 A	*	1 A *	
<i>Viburnum acerifolium</i>	Maple-leaved viburnum	1 A	3 B	3 B	3 B	1 A 2 A	
<i>Cornus alternifolia</i>	Alternate-leaved dogwood	*	1 A	1 A	2 A	* 1 A	
<i>Ribes cynosbati</i>	Prickly gooseberry		1 A	1 A	3 A	1 A 2 A	
<i>Hamamelis virginiana</i>	Witch hazel		*	3 B	*	2 B 1 B	
<i>Sambucus pubens</i>	Red-berried elder					2 A *	

Region 8

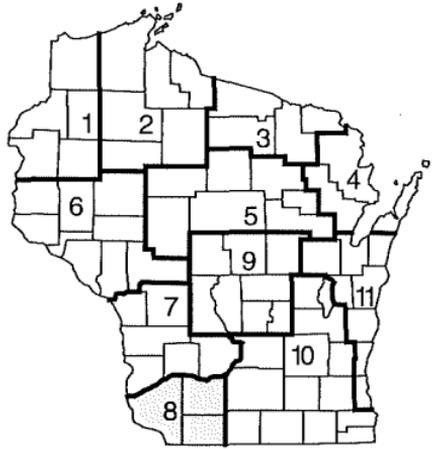
Extent, topography, geology and soils

Region 8 represents the southern most portion of Wisconsin's Driftless Area. It is bounded by the Mississippi River in the west and Wisconsin Rivers in the north. It includes Grant, Iowa and Lafayette counties.

In this part of the driftless region loess, one to four feet thick, overlies cherty red clay on dolomite bedrock ridges. Many sandstone valley sides are blanketed with loam and silt-loam materials. The most important soils are Tama, Dodgeville, Fayette, Dubuque and Palsgrove silt loams. The entire region falls within natural subdivision 6d. (For further description of the driftless area refer to region 7).

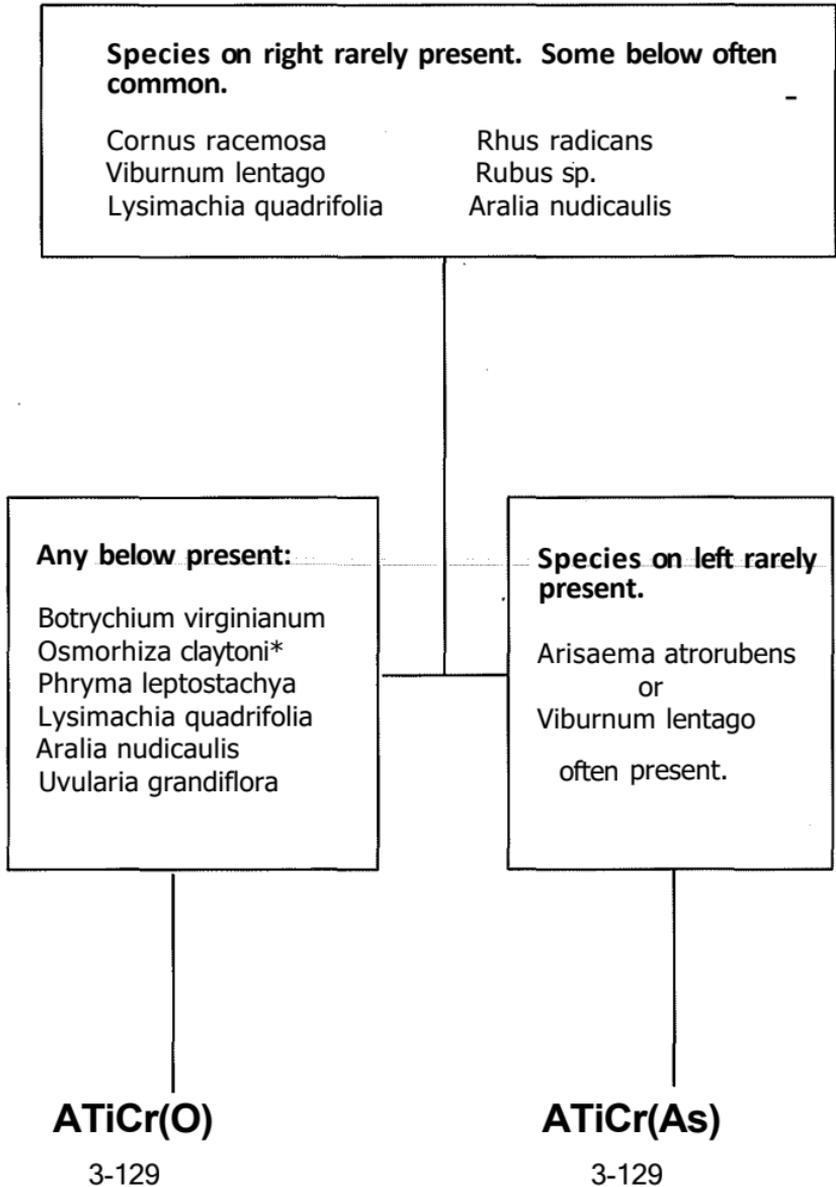
Forest vegetation

Presettlement vegetation was strongly controlled by fire disturbance. It consisted of oak savanna and oak forest of bur, white and black oak. Prairie occupied the ridge tops and the outwash terraces of principal river valleys. Red and white pine relicts were present on some north-facing sandstone bluffs. However, the climate and soils of the region are clearly capable of supporting mesic forests. Throughout the region pockets of sugar maple-basswood forests existed on fire-protected landscapes.



Most of the region is currently in agriculture. Forests are found almost entirely on steeper slopes, but considerable acreage of farm land is increasingly reverting to forest. Although the 81 stands sampled in this region represent a range of forest cover types, they all fall into only two site type categories i.e. dry-mesic, nutrient rich and mesic, nutrient rich to very rich sites. Drier and less fertile sites, of course, do exist in the region, but vegetation is usually severely disturbed and forest stands with normal stocking and canopy closure are difficult to find. However, such sites are easy to identify by direct observation. They are generally characterized by a combination of any of the following factors: Shallow soils, steep upper slopes and narrow ridges, S and SW exposure and sandy texture.

Key to Habitat Types of Region 8 - Scientific Names



Group below well represented: Several species are found rather than any one being common.

Poorly represented: Usually no more than one species from the group present. Abundance may be low or high.

* - This species carries the most weight.

(C)-Common: >1%

Two or more present:

Sanguinaria canadensis
Cryptotaenia canadensis
Hydrophyllum virginianum
Caulophyllum thalictroides

Laportea canadensis
Viola pubescens
Hepatica acutiloba

**Species below better
represented than group
on right.**

Laportea canadensis
Desmodium glutinosum

**Species below better
represented than group
on left.**

Hepatica acutiloba
Hydrophyllum virg.
Acer saccharum

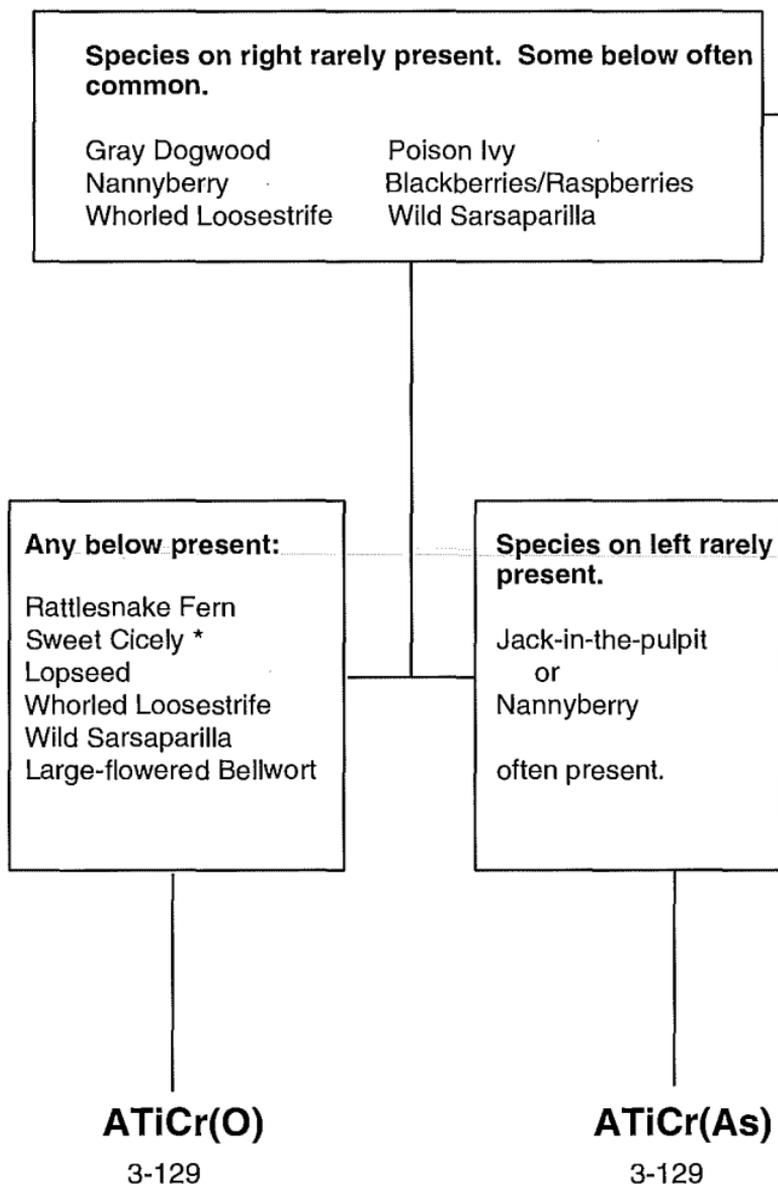
ATiAs(De)

3-134

ATiH

3-134

Key to Habitat Types of Region 8 - Common Names



Group below well represented: Several species are found rather than any one being common.

Poorly represented: Usually no more than one species from the group present. Abundance may be low or high.

* - This species carries the most weight.

(C) - Common: >1%

Two or more present:

Bloodroot

Honewort

Virginia Waterleaf

Blue Cohosh

Wood Nettle

Downy Yellow Violet

Sharp-lobed Hepatica

Species below better represented than group on right.

Wood Nettle

Pointed-leaved

Tick Trefoil

Species below better represented than group on left.

Sharp-lobed Hepatica

Virginia Waterleaf

Sugar Maple

ATiAs(De)

3-134

ATiH

3-134

Comparison of Major Floristic Differences Between Closely Related Habitat Types in Region 8

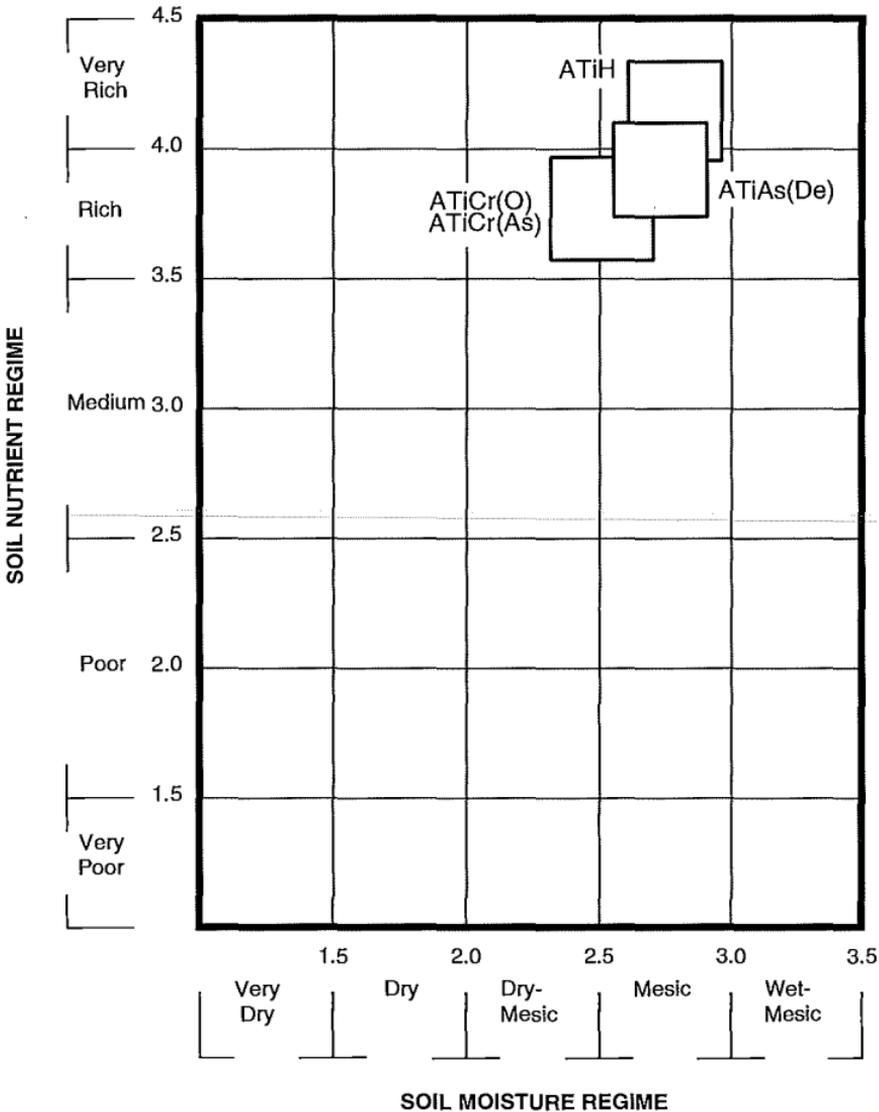
		ATICr(O)	ATICr(As)
Phryma leptostachya	Lopseed	90	31
Osmorhiza claytoni	Sweet cicely	87	5
Amphicarpa bracteata	Hog peanut	72	36
Corylus cornuta	Beaked hazelnut	66,9	31,1
Botrychium virginianum	Rattlesnake fern	66	5
Sanicula marilandica	Black snakeroot	60	.
Aralia nudicaulis	Wild sarsaparilla	45	.
Lysimachia quadrifolia	Whorled loosestrife	42	.
Viburnum lentago	Nannyberry	15	73
Arisaema atrorubens	Jack-in-the-pulpit	12	68
		ATICr(O)	ATIh
Rubus spp.	Blackberries/raspberries	93,9	44,1
Cornus racemosa	Gray dogwood	87,4	11,1
Desmodium glutinosum	Pointed-leaved tick trefoil	81,8	44,1
Rhus radicans	Poison ivy	72,4	11,1
Sanicula marilandica	Black snakeroot	60	.
Aralia nudicaulis	Wild sarsaparilla	45	11
Lysimachia quadrifolia	Whorled loosestrife	42	.
Hepatica acutiloba	Sharp-lobed hepatica	.	100
Hydrophyllum virgin.	Virginia waterleaf	6,1	88,21
Podophyllum peltatum	Mayapple	18	88
Arisaema atrorubens	Jack-in-the-pulpit	12	88
Actaea spp.	Baneberries	24	77
Cryptotaenia can.	Honewort	27,1	55,3
Viola pubescens	Downy yellow violet	15	55
Caulophyllum thal.	Blue cohosh	12	55
Thalictrum dioicum	Early meadow rue	.	33
		ATICr(As)	ATIh
Rubus spp.	Blackberries/raspberries	94,7	44,1
Cornus racemosa	Gray dogwood	73,6	11,1
Viburnum lentago	Nannyberry	73	.
Corylus americana	Hazel-nut	42	11
Corylus cornuta	Beaked hazelnut	31	.
Hepatica acutiloba	Sharp-lobed hepatica	5	100
Hydrophyllum virgin.	Virginia waterleaf	15,1	88,21
Osmorhiza claytoni	Sweet cicely	5	88
Podophyllum peltatum	Mayapple	57,2	88,7
Botrychium virginianum	Rattlesnake fern	5	77
Uvularia grandiflora	Large-flowered bellwort	5	77
Viola pensylvanica	Smooth yellow violet	26	66
Caulophyllum thal.	Blue cohosh	15	55
Cryptotaenia can.	Honewort	.	55
Sanicula gregaria	Clustered snakeroot	21,1	55,6

		ATICr(O)	ATIAs(De)
Rubus spp.	Blackberries/raspberries	93,9	73,1
Cornus racemosa	Gray dogwood	87	31
Rhus radicans	Poison ivy	72	26
Lysimachia quadrifolia	Whorled loosestrife	42	.
Potentilla simplex	Common cinquefoil	33	.
Fragaria vesca	Wood strawberry	33	.
Arisaema atrorubens	Jack-in-the-pulpit	12	100
Cryptotaenia can.	Honewort	27	78
Podophyllum peltatum	Mayapple	18	78
Viola pubescens	Downy yellow violet	15	78
Laportea canadensis	Wood nettle	12	63
Sanicula gregaria	Clustered snakeroot	21	52
Caulophyllum thal.	Blue cohosh	12	42

		ATICr(As)	ATIAs(De)
Cornus racemosa	Gray dogwood	73,6	31,1
Viburnum lentago	Nannyberry	73	5
Corylus americana	Hazel-nut	42,4	10,1
Phryma leptostachya	Lopseed	31	89
Botrychium virginianum	Rattlesnake fern	5	84
Osmorhiza claytoni	Sweet cicely	5,1	84,5
Cryptotaenia can.	Honewort	.	78
Laportea canadensis	Wood nettle	5	63
Sambucus pubens	Red-berried elder	5	57
Caulophyllum thal.	Blue cohosh	15	42

		ATIh	ATIAs(De)
Hepatica acutiloba	Sharp-lobed hepatica	100	.
Hydrophyllum virgin.	Virginia waterleaf	88,21	21,1
Viola pensylvanica	Smooth yellow violet	66	26
Desmodium glutinosum	Pointed-lyd tick trefoil	44,1	87,5
Smilacina racemosa	False solomon's seal	44	78
Laportea canadensis	Wood nettle	11	63
Sambucus pubens	Red-berried elder	22	57
Corylus cornuta	Beaked hazelnut	.	42
Smilax tamnoides	Bristly greenbrier	11	42

Relationship of Habitat Types to Soil Moisture and Nutrient Regimes in Region 8



ATiCr(O) and ATiCr(As)
Acer saccharum-Tilia/Cornus racemosa
(*Osmorhiza* Phase)
Sugar maple-Basswood/Gray dogwood
(Sweet cicely Phase)
and *Arisaema* (Jack-in -the-pulpit) Phase

Distribution:

Throughout Grant, Iowa, Lafayette and western Dane counties. Natural Subdivision 6d.

Similar types: ATiFrVb (Region 10).

Landform and soils:

The region as a whole can be characterized as undulating to hilly landscape dominated by silt loams and loams over cherty red clay, dolomite and sandstone. Because topographic, geologic and soil factors compensate for one another in many ways no specific landscape pattern can be associated with these types. Never the less floristic composition clearly reflects **dry-mesic, nutrient rich** sites. It is important to note that most of flat to rolling terrain is currently in agricultural use. Wooded areas are largely restricted to steeper slopes and narrow drainages.

Vegetation:

Common forest cover types: *Red oak* and *white oak* are principal dominants on both habitat type phases. *Elm* is the only other common associate. *Bitternut hickory*, *white ash*, *basswood* or *sugar*

maple are sometimes found on the **Arisaema** phase.

Shrub and small tree layer: This layer is exceptionally well developed on these types. Most prominent species are: *wild currants* and *gooseberries*, *choke cherry*, *blackberries*, *black cherry*, *gray dogwood*, *elms* and *hazel*. *Ironwood* (*Ostrya*) is more common on the **Arisaema** phase.

Ground flora characteristics:

Common species that are well represented on both phases are: *Virginia creeper*, *enchanter's nightshade*, *pointed-leaf tick trefoil* and *wild geranium*. The following species occur with relatively high constancy on the **Osmorhiza** phase and are absent or rare on the **Arisaema** phase: *sweet cicely*, *lopseed*, *rattlesnake fern*, *black snakeroot*, and *wild sarsaparilla*. Present with higher frequency on the **Arisaema** phase are: *Jack-in-the-pulpit*, *mayapple* and *nannyberry*.

Disturbance and succession:

The vegetation of the entire region 11 was strongly controlled by fire disturbance in presettle-

ment time. The **ATiCr** plant association represents former oak openings and mixed oak woodlands. We are not certain what kind of mature communities would develop on these sites in the absence of disturbance. Nevertheless, soil characteristics and understory flora strongly suggest that succession by species normally associated with mesic forests is likely. For this reason the type was classified as **Acer-Tilia** even though these species

are not present in most current stands. The **Osmorhiza** and **Arisaema** phases are distinguished here primarily to facilitate further studies on the development of these communities. While both phases clearly represent successional vegetation they display some striking floristic differences that may provide clues to mechanisms controlling successional process in this climatic region.

ATiCr(O)

Understory species in order of decreasing constancy, with average coverage.

Scientific name	Common name	Constancy Coverage	
		%	%
Herbs			
Parthenocissus quinquefolia	Virginia creeper	96	16.02
Phryma leptostachya	Lopseed	90	1.16
Osmorhiza claytoni	Sweet cicely	87	2.33
Vitis riparia	Riverbank grape	87	1.42
Circaea quadrisulcata	Enchanter's nightshade	87	1.82
Desmodium glutinosum	Pointed-leaved tick trefoil	81	8.13
Grasses spp.	Grasses	78	0.89
Rhus radicans	Poison ivy	72	4.13
Amphicarpa bracteata	Hog peanut	72	1.79
Geum canadense	White avens	72	0.77
Geranium maculatum	Wild geranium	69	8.67
Galium triflorum	Sweet-scented bedstraw	66	1.55
Botrychium virginianum	Rattlesnake fern	66	0.37
Smilacina racemosa	False solomon's seal	63	0.55
Smilax herbacea	Carrion flower	63	0.38
Sanicula marilandica	Black snakeroot	60	1.86
Anemone quinquefolia	Wood anemone	57	0.34
Galium aparine	Cleavers	54	0.29
Agrimonia gryposepala	Agrimony	51	0.67
Ranunculus abortivus	Small-flowered crowfoot	51	0.19
Viola pensylvanica	Smooth yellow violet	45	0.55
Aralia nudicaulis	Wild sarsaparilla	45	6.45
Lysimachia quadrifolia	Whorled loosestrife	42	0.84
Galium asprellum	Cleavers	42	0.76
Adiantum pedatum	Maidenhair fern	39	1.55
Dryopteris spinulosa	Spinulose shield fern	39	3.40
Aster spp.	Asters	36	0.88
Smilacina stellata	Star-flowered solomon's seal	36	0.51
Potentilla simplex	Common cinquefoil	33	0.45
Fragaria vesca	Wood strawberry	33	0.67
Prenanthes alba	White lettuce	30	0.15
Uvularia grandiflora	Large-flowered bellwort	30	1.41
Solidago spp.	Goldenrods	27	0.32
Cryptotaenia canadensis	Honewort	27	0.70
Dioscorea villosa	Wild yam root	24	0.22
Actaea spp.	Baneberries	24	0.10
Ranunculus recurvatus	Hooked crowfoot	21	0.17
Aquilegia canadensis	Wild columbine	21	0.73
Sanicula gregaria	Clustered snakeroot	21	2.86
Shrubs			
Prunus virginiana	Chokecherry	96	4.01
Rubus spp.	Blackberries/raspberries	93	8.94
Ribes cynosbati	Prickly gooseberry	93	7.39
Cornus racemosa	Gray dogwood	87	3.69

continued...

... continued

Scientific name	Common name	Constancy Coverage	
		%	%
<i>Xanthoxylum americanum</i>	Prickly ash	75	6.76
<i>Corylus cornuta</i>	Beaked hazelnut	66	9.93
<i>Amelanchier</i> spp.	Juneberry	39	4.98
<i>Rosa</i> spp.	Roses	36	0.15
<i>Sambucus pubens</i>	Red-berried elder	24	0.16
<i>Corylus americana</i>	Hazel-nut	21	3.27
Tree Seedlings			
<i>Prunus serotina</i>	Black cherry	93	3.12
<i>Ulmus</i> spp	Elms	87	3.18
<i>Carya ovata</i>	Shagbark hickory	84	1.23
<i>Quercus rubra</i>	Northern red oak	81	1.03
<i>Quercus alba</i>	White oak	63	1.69
<i>Acer negundo</i>	Box elder	54	0.41
<i>Carya cordiformis</i>	Bitternut hickory	54	1.10
<i>Tilia americana</i>	Basswood	42	1.65
<i>Acer rubrum</i>	Red maple	36	3.39
<i>Fraxinus americana</i>	White ash	36	4.23
<i>Acer saccharum</i>	Sugar maple	30	2.61
<i>Populus grandidentata</i>	Bigtooth aspen	21	0.66

ATiCr(As)

Understory species in order of decreasing constancy, with average coverage.

Scientific name	Common name	Constancy %	Coverage %
Herbs			
<i>Parthenocissus quinquefolia</i>	Virginia creeper	100	11.33
<i>Geranium maculatum</i>	Wild geranium	94	5.90
<i>Circaea quadrisulcata</i>	Enchanter's nightshade	94	3.24
<i>Vitis riparia</i>	Riverbank grape	78	0.33
<i>Arisaema atrorubens</i>	Jack-in-the-pulpit	68	0.89
<i>Rhus radicans</i>	Poison ivy	63	0.43
<i>Podophyllum peltatum</i>	Mayapple	57	1.60
<i>Smilacina racemosa</i>	False solomon's seal	57	0.64
Grasses spp.	Grasses	52	1.84
<i>Anemone quinquefolia</i>	Wood anemone	52	0.20
<i>Geum canadense</i>	White avens	52	0.41
<i>Dryopteris spinulosa</i>	Spinulose shield fern	52	1.70
<i>Desmodium glutinosum</i>	Pointed-leaved tick trefoil	52	3.76
<i>Dioscorea villosa</i>	Wild yam root	47	0.27
<i>Smilax herbacea</i>	Carrion flower	47	0.16
<i>Galium aparine</i>	Cleavers	42	0.47
<i>Actaea</i> spp.	Baneberries	31	0.27
<i>Phryma leptostachya</i>	Lopseed	31	0.10
<i>Viola pensylvanica</i>	Smooth yellow violet	26	0.20
<i>Ranunculus abortivus</i>	Small-flowered crowfoot	26	0.20
<i>Galium triflorum</i>	Sweet-scented bedstraw	26	0.20
<i>Sanicula gregaria</i>	Clustered snakeroot	21	0.60
<i>Viola pubescens</i>	Downy yellow violet	21	0.22
<i>Potentilla simplex</i>	Common cinquefoil	21	0.22
<i>Agrimonia gryposepala</i>	Agrimony	21	0.22
<i>Sanguinaria canadensis</i>	Bloodroot	21	0.10
Shrubs			
<i>Corylus americana</i>	Hazel-nut	42	4.01
<i>Amphicarpa bracteata</i>	Hog peanut	36	0.31
<i>Rubus</i> spp.	Blackberries/raspberries	94	6.67
<i>Ribes cynosbati</i>	Prickly gooseberry	89	6.78
<i>Prunus virginiana</i>	Chokecherry	78	3.22
<i>Cornus racemosa</i>	Gray dogwood	73	5.63
<i>Viburnum lentago</i>	Nannyberry	73	0.34
<i>Xanthoxylum americanum</i>	Prickly ash	52	5.25
<i>Cornus alternifolia</i>	Alternate-leaved dogwood	31	0.35
<i>Corylus cornuta</i>	Beaked hazelnut	31	0.83
<i>Amelanchier</i> spp.	Juneberry	21	1.55
Tree Seedlings			
<i>Prunus serotina</i>	Black cherry	94	2.33
<i>Carya cordiformis</i>	Bitternut hickory	89	1.10
<i>Quercus rubra</i>	Northern red oak	84	0.41
<i>Ulmus</i> spp.	Elms	68	0.66
<i>Tilia americana</i>	Basswood	52	3.23
<i>Fraxinus americana</i>	White ash	36	1.49
<i>Quercus alba</i>	White oak	26	0.40
<i>Populus grandidentata</i>	Bigtooth aspen	21	0.35
<i>Acer negundo</i>	Box elder	21	0.82
<i>Juglans nigra</i>	Black walnut	21	0.35

ATiH and ATiAs(De)
Acer saccharum-Tilia/Hydrophilum
(Sugar maple-Basswood/Virginia waterleaf)
and
Acer saccharum-Tilia/Arisaema (Desmodium Phase)
(Sugar maple-Basswood/Jack-in-the-pulpit)
(Tick trefoil Phase)

Distribution:

Grant county (primarily on the Mississippi valley slopes), Lafayette county (south of the "Military Ridge") and parts of western Iowa county. Natural Subdivision 6d.

Similar types: ATiFrCa (Region 10), ATiCa (Region 7).

Landform and soils:

(See **ATiCr** type for general description). Although topographic, geologic and soil factors strongly compensate for one another so that every habitat type can be found on a variety of landscape positions, The **ATiH** and **ATiAs(De)** types are strongly associated with north and east slope aspects. In addition the **ATiH** type is most common on lower slopes and **ATiAs(De)** on mid to upper slopes. Both types are classified as **mesic, nutrient very rich**.

Vegetation:

Common forest cover types: *sugar maple* and *red oak* are principal dominants on the **ATiH** type. *White oak*, *American elm*

and *bitternut hickory* are common associates. *Basswood* and *white ash* are not well represented. On the **ATiAs(De)** type *white oak*, *elm*, *red oak* and *black cherry* most often share dominance. *Sugar maple* is generally less well represented than on **ATiH** type.

Shrub and small tree layer: The lack of a dense shrub layer generally distinguishes the mesic types of this region from the dry-mesic ones. *Wild currants* and *gooseberries* are the principal shrub species and are much more common on the **ATiAs(De)** type.

Ground flora characteristics:

The two types share most of the common understory flora. Some of the best represented species are: *wild geranium*, *enchanter's nightshade*, *sweet cicely*, *mayapple*, *jack-in-the-pulpit*, *rattlesnake fern*, *lopseed* and *greenbrier*. The most conspicuous differences between the two types are strong representation of *Virginia waterleaf* and *sharp-lobed hepatica* on

the **ATiH** type and *tick-trefoil* and *wood nettle* on the **ATiAs(De)** type.

Disturbance and succession: Records of presettlement vegetation indicate that sample stands comprising these two mesic habitat types were not different from those of the dry-mesic sites in terms of dominant tree species. All were dominated by oaks either as oak openings or oak forests. Never the less, it appears that fires were considerably less frequent or less intense on these sites because fire sensitive mesic hardwoods are today well repre-

sented at least on the **ATiH** habitat type. Stands of the **ATiAs(De)** type do indicate stronger fire influence. The 19 stands in our sample comprising the **ATiAs(De)** type are not yet dominated by shade tolerant mesic hardwoods, but the trends in that direction are clearly apparent. For this reason the type was designated as a phase (characterized by *Desmodium*). We do not know what the composition of a mature association would be on this habitat type, because no such stands were found. Thus no **ATiAs** habitat type was delineated at this time.

ATI_H

Understory species in order of decreasing constancy, with average coverage.

Scientific name	Common name	Constancy Coverage	
		%	%
Herbs			
<i>Geranium maculatum</i>	Wild geranium	100	4.22
<i>Hepatica acutiloba</i>	Sharp-lobed hepatica	100	2.30
<i>Circaea quadrifida</i>	Enchanter's nightshade	88	4.14
<i>Galium aparine</i>	Cleavers	88	0.10
<i>Hydrophyllum virginianum</i>	Virginia waterleaf	88	21.04
Grasses spp.	Grasses	88	0.84
<i>Osmorhiza claytoni</i>	Sweet cicely	88	2.51
<i>Podophyllum peltatum</i>	Mayapple	88	6.54
<i>Arisaema atrorubens</i>	Jack-in-the-pulpit	88	0.60
<i>Ranunculus abortivus</i>	Small-flowered crowfoot	88	0.22
<i>Actaea</i> spp.	Baneberries	77	0.17
<i>Botrychium virginianum</i>	Rattlesnake fern	77	0.24
<i>Anemone quinquefolia</i>	Wood anemone	77	0.24
<i>Phryma leptostachya</i>	Lopseed	77	0.24
<i>Parthenocissus quinquefolia</i>	Virginia creeper	77	4.84
<i>Sanguinaria canadensis</i>	Bloodroot	77	0.53
<i>Uvularia grandiflora</i>	Large-flowered bellwort	77	0.31
<i>Smilax herbacea</i>	Carrion flower	77	0.39
<i>Dryopteris spinulosa</i>	Spinulose shield fern	66	0.27
<i>Viola pensylvanica</i>	Smooth yellow violet	66	0.35
<i>Vitis riparia</i>	Riverbank grape	55	0.10
<i>Caulophyllum thalictroides</i>	Blue cohosh	55	0.88
<i>Adiantum pedatum</i>	Maidenhair fern	55	0.78
<i>Sanicula gregaria</i>	Clustered snakeroot	55	6.06
<i>Dioscorea villosa</i>	Wild yam root	55	0.10
<i>Viola pubescens</i>	Downy yellow violet	55	0.78
<i>Cryptotaenia canadensis</i>	Honewort	55	3.08
<i>Geum canadense</i>	White avens	55	0.20
<i>Aster</i> spp.	Asters	44	0.35
<i>Desmodium glutinosum</i>	Pointed-leaved tick trefoil	44	0.22
<i>Trillium cernuum</i>	Nodding trillium	44	0.35
<i>Smilacina racemosa</i>	False solomon's seal	44	0.22
<i>Amphicarpa bracteata</i>	Hog peanut	33	0.10
<i>Prenanthes alba</i>	White lettuce	33	0.10
<i>Galium triflorum</i>	Sweet-scented bedstraw	33	0.27
<i>Thalictrum dioicum</i>	Early meadow rue	33	6.03
<i>Polygonum virginianum</i>	Virginia knot-weed	33	0.10
<i>Desmodium nudiflorum</i>	Naked-flowered tick trefoil	22	0.10
<i>Polygonatum pubescens</i>	Hairy solomon's seal	22	0.35
<i>Ranunculus recurvatus</i>	Hooked crowfoot	22	0.10
<i>Aralia racemosa</i>	Spikenard	22	0.35
<i>Panax quinquefolius</i>	Ginseng	22	0.35
<i>Solidago ulmifolia</i>	Elm-leaved goldenrod	22	0.35

Scientific name	Common name	Constancy Coverage	
		%	%
Shrubs			
<i>Ribes cynosbati</i>	Prickly gooseberry	100	3.21
<i>Prunus virginiana</i>	Chokecherry	88	1.01
<i>Rubus</i> spp.	Blackberries/raspberries	44	0.10
<i>Cornus alternifolia</i>	Alternate-leaved dogwood	44	0.10
<i>Sambucus canadensis</i>	Common elder	33	0.10
<i>Xanthoxylum americanum</i>	Prickly ash	33	0.27
<i>Viburnum rafinesquianum</i>	Downy arrowwood	22	0.10
<i>Sambucus pubens</i>	Red-berried elder	22	0.10
Tree Seedlings			
<i>Acer saccharum</i>	Sugar maple	88	3.24
<i>Ulmus</i> spp	Elms	77	0.17
<i>Carya cordiformis</i>	Bitternut hickory	66	0.10
<i>Ostrya virginiana</i>	Ironwood	66	0.10
<i>Prunus serotina</i>	Black cherry	66	0.18
<i>Quercus rubra</i>	Northern red oak	66	0.27
<i>Fraxinus americana</i>	White ash	55	3.18
<i>Tilia americana</i>	Basswood	55	0.30
<i>Carya ovata</i>	Shagbark hickory	55	0.40
<i>Carpinus caroliniana</i>	American hornbeam	22	0.35
<i>Quercus alba</i>	White oak	22	0.10

ATiAs(De)

Understory species in order of decreasing constancy, with average coverage.

Scientific name	Common name	Constancy Coverage	
		%	%
Herbs			
<i>Circaea quadrisulcata</i>	Enchanter's nightshade	100	7.06
<i>Arisaema atrorubens</i>	Jack-in-the-pulpit	100	0.87
<i>Geranium maculatum</i>	Wild geranium	89	4.61
Grasses spp.	Grasses	89	0.45
<i>Parthenocissus quinquefolia</i>	Virginia creeper	89	7.82
<i>Phryma leptostachya</i>	Lopseed	89	0.59
<i>Desmodium glutinosum</i>	Pointed-leaved tick trefoil	89	5.34
<i>Osmorhiza claytoni</i>	Sweet cicely	84	5.46
<i>Botrychium virginianum</i>	Rattlesnake fern	84	0.29
<i>Smilax herbacea</i>	Carrion flower	78	0.37
<i>Podophyllum peltatum</i>	Mayapple	78	6.64
<i>Smilacina racemosa</i>	False solomon's seal	78	0.75
<i>Viola pubescens</i>	Downy yellow violet	78	1.49
<i>Cryptotaenia canadensis</i>	Honewort	78	2.45
<i>Geum canadense</i>	White avens	73	0.97
<i>Ranunculus abortivus</i>	Small-flowered crowfoot	73	0.31
<i>Dryopteris spinulosa</i>	Spinulose shield fern	68	1.62
<i>Galium aparine</i>	Cleavers	68	0.78
<i>Laportea canadensis</i>	Wood nettle	63	0.87
<i>Vitis riparia</i>	Riverbank grape	57	1.59
<i>Anemone quinquefolia</i>	Wood anemone	52	0.25
<i>Sanicula gregaria</i>	Clustered snakeroot	52	7.99
<i>Amphicarpa bracteata</i>	Hog peanut	52	0.64
<i>Adiantum pedatum</i>	Maidenhair fern	47	0.32
<i>Uvularia grandiflora</i>	Large-flowered bellwort	47	0.38
Aster spp.	Asters	47	0.21
<i>Actaea</i> spp.	Baneberries	42	0.35
<i>Caulophyllum thalictroides</i>	Blue cohosh	42	2.15
<i>Smilax tamnoides</i>	Bristly greenbrier	42	0.22
<i>Galium triflorum</i>	Sweet-scented bedstraw	42	0.65
<i>Sanguinaria canadensis</i>	Bloodroot	42	0.47
<i>Ranunculus recurvatus</i>	Hooked crowfoot	42	0.16
<i>Smilacina stellata</i>	Star-flowered solomon's seal	31	0.10
<i>Rhus radicans</i>	Poison ivy	26	1.36
<i>Polygonum virginianum</i>	Virginia knot-weed	26	0.20
<i>Dioscorea villosa</i>	Wild yam root	26	0.78
<i>Galium asprellum</i>	Cleavers	26	0.40
<i>Sanicula marilandica</i>	Black snakeroot	26	4.34
<i>Viola pensylvanica</i>	Smooth yellow violet	26	0.98
<i>Solidago</i> spp.	Goldenrods	26	0.20
<i>Agrimonia gryposepala</i>	Agrimony	21	0.10
<i>Panax quinquefolius</i>	Ginseng	21	0.10
<i>Thalictrum dioicum</i>	Early meadow rue	21	0.82
<i>Hydrophyllum virgin.</i>	Virginia waterleaf	21	0.35
<i>Desmodium nudiflorum</i>	Naked-flowered tick trefoil	21	0.22

Scientific name	Common name	Constancy Coverage	
		%	%
Shrubs			
<i>Ribes cynosbati</i>	Prickly gooseberry	89	13.96
<i>Rubus</i> spp.	Blackberries/raspberries	73	0.38
<i>Prunus virginiana</i>	Chokecherry	63	1.03
<i>Sambucus pubens</i>	Red-berried elder	57	0.33
<i>Xanthoxylum americanum</i>	Prickly ash	42	0.65
<i>Corylus cornuta</i>	Beaked hazelnut	42	2.51
<i>Cornus racemosa</i>	Gray dogwood	31	0.67
Trees Seedlings			
<i>Ulmus</i> spp.	Elms	94	3.04
<i>Carya ovata</i>	Shagbark hickory	68	0.25
<i>Prunus serotina</i>	Black cherry	63	0.75
<i>Acer saccharum</i>	Sugar maple	57	2.99
<i>Carya cordiformis</i>	Bitternut hickory	57	2.12
<i>Quercus rubra</i>	Northern red oak	52	0.10
<i>Fraxinus americana</i>	White ash	52	3.76
<i>Ostrya virginiana</i>	Ironwood	42	2.51
<i>Tilia americana</i>	Basswood	26	0.10
<i>Quercus alba</i>	White oak	21	0.10
<i>Acer negundo</i>	Box elder	21	0.22

Occurrence of Tree Species on Habitat Types of Region 8

Size classes: SE - seedlings; SA - saplings; MT - medium trees (4-10" DBH); LT - large trees (>10" DBH). Numbers are frequency of occurrence: * <10%; 1, 10-25%; 2, 26-50%; 3, 51-75%; 4, 76-100%. Letters are coverage classes: A <5%; B 5-15%; C 16-35%; D >35%.

	ATICr(O)				ATICr(As)				ATIAs(De)				ATIH			
	SE	SA	MT	LT	SE	SA	MT	LT	SE	SA	MT	LT	SE	SA	MT	LT
Jack pine																
Bur oak	*		*	1C				*	*	1A	*	1D				1D
Northern pin oak			*	*	*							1D				
Trembling aspen			*					*								
Bigtooth aspen	1A	1A	1A	*	1A	*		*	1A			1D	1A			1B
Red pine			*													
Black oak	*		*	1C				*				*				1D
Black walnut	1A		*	*	1A	1A	1B	1D	*	1A	1C	1C	1A		1B	1B
Paper birch		*	1C	*												
Black ash		*							*	1A			1A		1B	
Northern red oak	3A	1A	2B	3D	2A	2A	2B	3D	1A	1B	1B	2C	1A		1B	3D
White pine		*	*	*		1A	*	*								
White oak	2A	1B	3B	3D	1A	2B	3C	3C		1B	1B	3C			2B	1B
Butternut	*	*	*	*	1A	*	1B	1C		*			1B	1A		1B
Swamp white oak	*	*	*	*												
Shagbark hickory	3A	3B	1C	*	*	1B	2B	*	1A		*	*	1A	1A	1B	
Black cherry	4A	3B	2B	*	4A	3B	1B		2A	1B	2A	2B	3A	1A	1B	1A
Box elder	2A	2B	*		1A	1B			1A	1A	1B					
Hackberry		*			*	1B			2A	2B	1C	1B	1A			
Elms	3A	3C	2B	1B	3A	3B	3B	1C	3A	3C	3C	2D	2A	2B	2B	2B
American elm																
White ash	2A	1B	1B	*	2A	1B	1A	2C	2A	2A	1B	2C	2A	2B	1A	1B
Green ash	*	*	*		*	*	*						1A	1B		
Yellow birch								*								
Bitternut hickory	3A	2B	*	*	4A	2C	1B	1C	3A	3B	1A		3A	2B	2B	1D
Red maple	2A	2C	1D	*	*	1C			*	*	*	*				
American hornbeam	*	*								*	*	*		1A	1C	
Ironwood	*	1C	*		2A	2C	2C		2A	3C	2C		3A	4C	2C	
Basswood	2A	2B	1B	*	2A	2C	2C	2B	*	2B	2B	1C	1A	1A	1C	2C
Eastern hemlock																
American beech																
Sugar maple	2A	1B	1C	*	2B	2B	2D	1D	2A	2C	2C	1D	4A	4D	4D	2D

Understory Species with Potential Diagnostic Value for Distinguishing among the Habitat Types in Region 8

Numbers represent frequency of occurrence classes: * 10-25%; 1, 26-50%; 2, 51-75%; 3, 76-100%. Letters are coverage classes: A<5%; B 6-15%; C>15%.

Scientific Name	Common Name	ATICr(O)	ATICr(As)	ATIAs(De)	ATIh
Herbs					
<i>Lysimachia quadrifolia</i>	Whorled loosestrife	1 A			
<i>Fragaria vesca</i>	Wood strawberry	1 A	*		
<i>Potentilla simplex</i>	Common cinquefoil	1 A	*		
<i>Sanicula marilandica</i>	Black snakeroot	2 A		1 A	
<i>Aralia nudicaulis</i>	Wild sarsaparilla	1 B			*
<i>Parthenocissus quinque.</i>	Virginia creeper	3 C	3 B	3 B	3 A
<i>Desmodium glutinosum</i>	Pointed-lyd. tick trefoil	3 B	2 A	3 B	1 A
<i>Circaea quadrisuicata</i>	Enchanter's nt.shade	3 A	3 A	3 B	3 A
<i>Phryma leptostachya</i>	Lopseed	3 A	1 A	3 A	3 A
<i>Vitis riparia</i>	Riverbank grape	3 A	3 A	2 A	2 A
<i>Geranium maculatum</i>	Wild geranium	2 B	3 B	3 A	3 A
<i>Anemone quinquefolia</i>	Wood anemone	2 A	2 A	2 A	3 A
<i>Ranunculus abortivus</i>	Small-flwr'd. crowfoot	2 A	1 A	2 A	3 A
<i>Smilax herbacea</i>	Carriion flower	2 A	1 A	3 A	3 A
<i>Galium aparine</i>	Cleavers	2 A	1 A	2 A	3 A
<i>Geum canadense</i>	White avens	2 A	2 A	2 A	2 A
<i>Amphicarpa bracteata</i>	Hog peanut	2 A	1 A	2 A	1 A
<i>Galium triflorum</i>	Sweet-scent. bedstraw	2 A	1 A	1 A	1 A
<i>Smilacina racemosa</i>	False solomon's seal	2 A	2 A	3 A	1 A
<i>Rhus radicans</i>	Poison Ivy	2 A	2 A	1 A	*
<i>Agrimonia gryposepala</i>	Agrimony	2 A	*	*	*
<i>Viola pensylvanica</i>	Smooth yellow violet	1 A	1 A	1 A	2 A
<i>Adiantum pedatum</i>	Maidenhair fern	1 A	1 A	1 A	2 A
<i>Dryopteris spinulosa</i>	Spinulose shield fern	1 A	2 A	2 A	2 A
<i>Galium asprellum</i>	Cleavers	1 A	*	1 A	*
<i>Podophyllum peltatum</i>	Mayapple	*	2 A	3 B	3 B
<i>Actaea spp.</i>	Baneberries	*	1 A	1 A	3 A
<i>Arisaema atrorubens</i>	Jack-in-the-pulpit	*	2 A	3 A	3 A
<i>Sanguinaria canadensis</i>	Bloodroot	*	*	1 A	3 A
<i>Sanicula gregaria</i>	Clustered snakeroot	*	*	2 B	2 B
<i>Caulophyl. thalictroides</i>	Blue cohosh	*	*	1 A	2 A
<i>Viola pubescens</i>	Downy yellow violet	*	*	3 A	2 A
<i>Dioscorea villosa</i>	Wild yam root	*	1 A	1 A	2 A
<i>Ranunculus recurvatus</i>	Hooked crowfoot	*	*	1 A	*
<i>Botrychium virginianum</i>	Rattlesnake fern	2 A		3 A	3 A
<i>Osmorhiza claytoni</i>	Sweet cicely	3 A		3 B	3 A
<i>Uvularia grandiflora</i>	Large-flwr'd. bellwort	1 A		1 A	3 A
<i>Cryptotaenia can.</i>	Honewort	1 A		3 A	2 A
<i>Smilacina stellata</i>	Star-flwr'd. solomon's seal	1 A		1 A	*
<i>Desmodium nudiflorum</i>	Naked-flwr'd. tick trefoil	*		*	*
<i>Smilax tamnoides</i>	Bristly greenbrier	*		1 A	*
<i>Laportea canadensis</i>	Wood nettle	*		2 A	*

Scientific Name	Common Name	ATICr(O)	ATICr(As)	ATIAs(De)	ATIH
<i>Hydrophil. virginianum</i>	Virginia waterleaf		*	*	3 C
<i>Thalictrum dioicum</i>	Early meadow rue		*	*	1 B
<i>Polygonum virginianum</i>	Virginia knot-weed		*	1 A	1 A
<i>Trillium cernuum</i>	Nodding trillium		*		1 A
<i>Aralia racemosa</i>	Spikenard	*			*
<i>Panax quinquefolius</i>	Ginseng			*	*
<i>Polygonatum pubes.</i>	Hairy solomon's seal			*	*
<i>Allium tricoccum</i>	Wild leek			*	*
<i>Alliaria officinalis</i>	Garlic mustard			*	*
<i>Hepatica acutiloba</i>	Sharp-lobed hepatica				3 A
Shrubs					
<i>Viburnum lentago</i>	Nannyberry	*	2 A		
<i>Amelanchier spp.</i>	Juneberry	1 A	*		*
<i>Viburnum acerifolium</i>	Maple-leaved viburnum	*	*		*
<i>Viburnum rafinesquianum</i>	Downy arrowwood	*	1 A		*
<i>Rosa spp.</i>	Roses	1 A	1 A	*	
<i>Corylus cornuta</i>	Beaked hazelnut	2 B	1 A	1 A	
<i>Ribes cynosbati</i>	Prickly gooseberry	3 B	3 B	3 B	3 A
<i>Rubus spp.</i>	Blackber./raspber.	3 B	3 B	2 A	1 A
<i>Prunus virginiana</i>	Chokecherry	3 A	3 A	2 A	3 A
<i>Cornus racemosa</i>	Gray dogwood	3 A	2 B	1 A	*
<i>Xanthoxylum amer.</i>	Prickly ash	2 B	2 B	1 A	1 A
<i>Cornus alternifolia</i>	Alt.-lvd. dogwood	*	1 A	*	1 A
<i>Corylus americana</i>	Hazel-nut	*	1 A	*	*
<i>Sambucus pubens</i>	Red-berried elder	*		2 A	*
<i>Sambucus canadensis</i>	Common elder				1 A

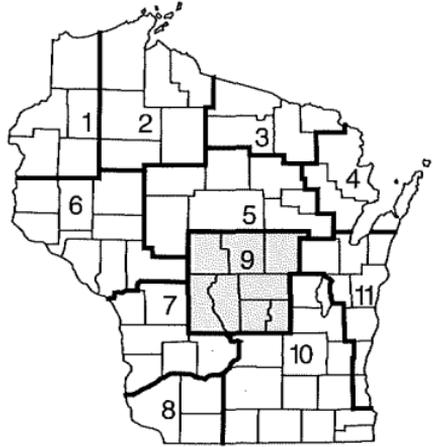
Region 9

Extent, topography, geology and soils

This region is centered on the Natural Division 4, generally known as the Central Plains, although of the eight counties it encompasses only Adams, Marquette and Waushara are almost entirely within the sandy plains of Division 4. The remaining five (Juneau, Wood, Portage, Wau-paca and Green) all extend, to one degree or another, into one of the five neighboring Natural Divisions. Thus, it is especially important that the user of this field guide within region 9 also carefully examine the Natural Divisions map and choose the appropriate habitat type identification key.

Natural Division 4 is divided into two major subdivisions. The western portion (subdivision 4a) is unglaciated lake plain, nearly level, with numerous sandstone buttes, especially in Adams county. Droughty and infertile soils prevail, but there are extensive areas of high water table occupied by swamp forests, sedge meadows and shrub carr. Plainfield sand is the most common soil on the uplands.

Subdivision 4b represents the glaciated portion of Natural Division 4 and encompasses the level to rolling pitted outwash and morainic ridges. Plainfield loamy sand is the dominant soil of the



outwash plains. Soils of the moraines include sandy loam with slight accumulation of clay in the subsoil. The Wyocena soil is a typical example.

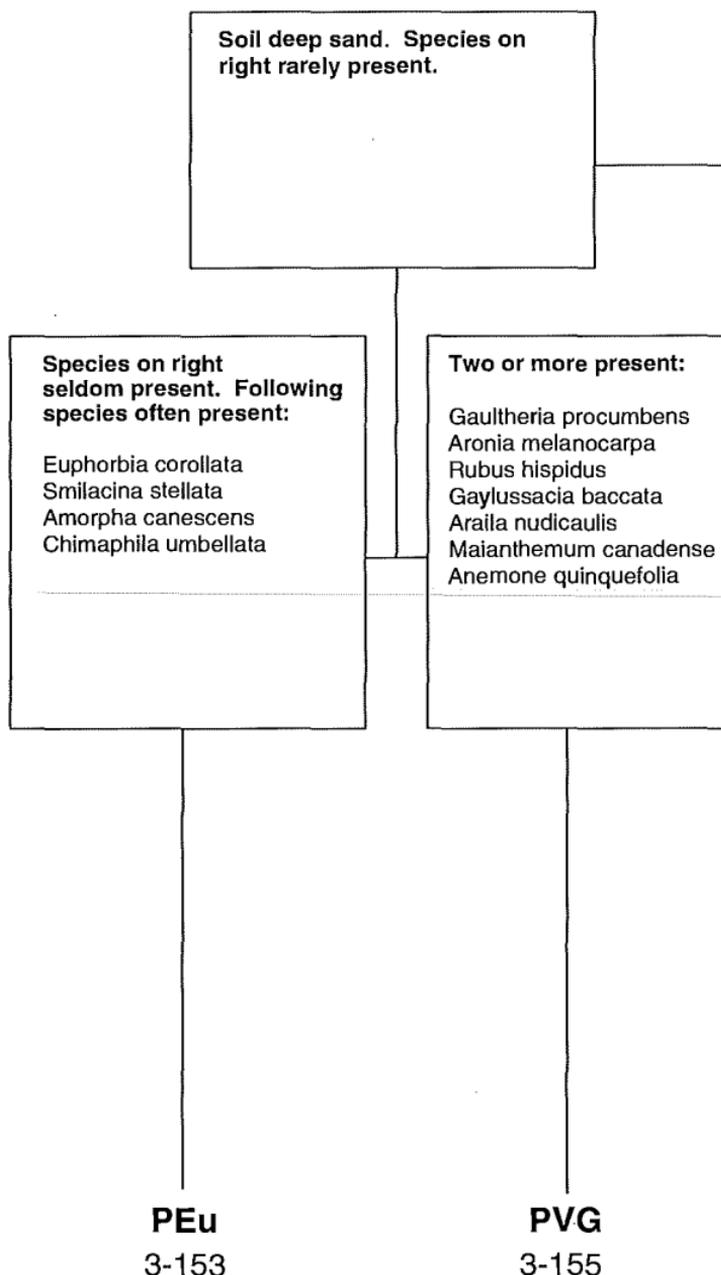
Forest vegetation

The presettlement vegetation included oak savanna, pine-oak barrens and extensive wetland communities. Fire maintained pine barrens were especially well represented in subdivision 4a, while oak savanna and oak openings were more common in subdivision 4b. Red pine, white pine, and red oak were also found on more favorable sites. Dry-mesic forests of sugar maple, basswood and white ash occurred only along the extreme north and east portions of the region on loamy soils of glacial till and where fires were much less frequent than in the rest of the region. True mesic forests were rare if not entirely absent.

The same species dominate today's forests although in different mixtures and in different proportions. On the driest sites black oak, northern pin oak and white oak prevail. Red oak, white pine and red maple occur only sporadically, but are much better represented on the somewhat better dry-mesic sites. Jack pine is not reproducing well in the absence of fire, but oaks, red maple and white pine show strong ability to

maintain themselves. White pine in particular is becoming better represented in many parts of the region than it was in presettlement time. The only other species reproducing successfully is black cherry, but it generally does not mature into a well formed tree. Sugar maple is generally absent even on the best dry-mesic sites, but white ash, basswood, red maple and shagbark hickory numbers increasing.

Key to Habitat Types of Region 9 - Scientific Names



Group below well represented: Several species are found rather than any one being common.

Poorly represented: Usually no more than one species from the group present. Abundance may be low or high.

* - This species carries the most weight. (C) - Common: >1%

**Soil loam or sandy loam.
At least 2 present:**

Osmorhiza claytoni
Phryma leptostachya
Desmodium glutinosum
Circaea quadrisulcata
Quercus rubra

**Species on right rarely
present. Some of the
following present:**

Helianthus sp.
Prenanthes alba
Pteridium aquilinum (C)
Apocynum androsaemifolium
Amorpha canescens
Smilacina stellata
Euphorbia corollata

Two or more present:

Viburnum acerifolium
Sanicula marilandica
Polygonatum pubescens
Mitchella repens
Hepatica americana
Aster macrophyllus
Hamamelis virginiana
Botrychium virginianum
Arisaema atrorubens
Geum canadense

Two or more present:

Dryopteris spinulosa
Virburnum acerifolium
Polygonatum pubescens
Mitchella repens
Aster macrophyllus
Sanicula marilandica

**Species on right absent
or rare.**

Two or more present:

Carya ovata
Dioscorea villosa
Cornus racemosa
Galium asperellum
Arisaema atrorubens
Geum canadense
Circaea quad. (C)

**Species on left absent
or rare.**

ArDe
3-158

AQVb-Gr
3-161

ATiFrCi
3-164

Key to Habitat Types of Region 9 - Common Names

Soil deep sand. Species on right rarely present.

Species on right seldom present. Following species often present:

Flowering Spurge
Star-flowered Solomon's Seal
Lead Plant
Pipsissewa

Two or more present:

Wintergreen
Black Chokeberry
Swamp Dewberry
Black Huckleberry
Wild Sarsaparilla
Wild Lily-of-the-valley
Wood Anemone

PEu
3-153

PVG
3-155

Group below well represented: Several species are found rather than any one being common.

Poorly represented: Usually no more than one species from the group present. Abundance may be low or high.

* - This species carries the most weight. (C) - Common: >1%

**Soil loam or sandy loam.
At least 2 present:**

Sweet Cicely
Lopseed
Pointed-leaved Tick Trefoil
Enchanter's Nightshade
Northern Red Oak

**Species on right rarely
present. Some of the
following present:**

Sunflowers
White Lettuce
Braken Fern (C)
Spreading Dogbane
Lead Plant
Star-flowered Solomon's Seal
Flowering Spurge

Two or more present:

Maple-leaved Viburnum
Black Snakeroot
Hairy Solomon's Seal
Partridgeberry
Round-lobed Hepatica
Large-leaved Aster
Witch Hazel
Rattlesnake Fern
Jack-in-the-pulpit
White Avens

Two or more present:

Spinulose Shield Fern
Maple-leaved
Viburnum
Hairy Solomon's Seal
Partridgeberry
Large-leaved Aster
Black Snakeroot

**Species on right absent
or rare.**

Two or more present:

Shagbark Hickory
Wild Yam Root
Gray Dogwood
Cleavers
Jack-in-the-pulpit
White Avens
Enchanter's
Nightshade (C)

**Species on left
absent or rare.**

ArDe
3-158

AQVb-Gr
3-161

ATiFrCi
3-164

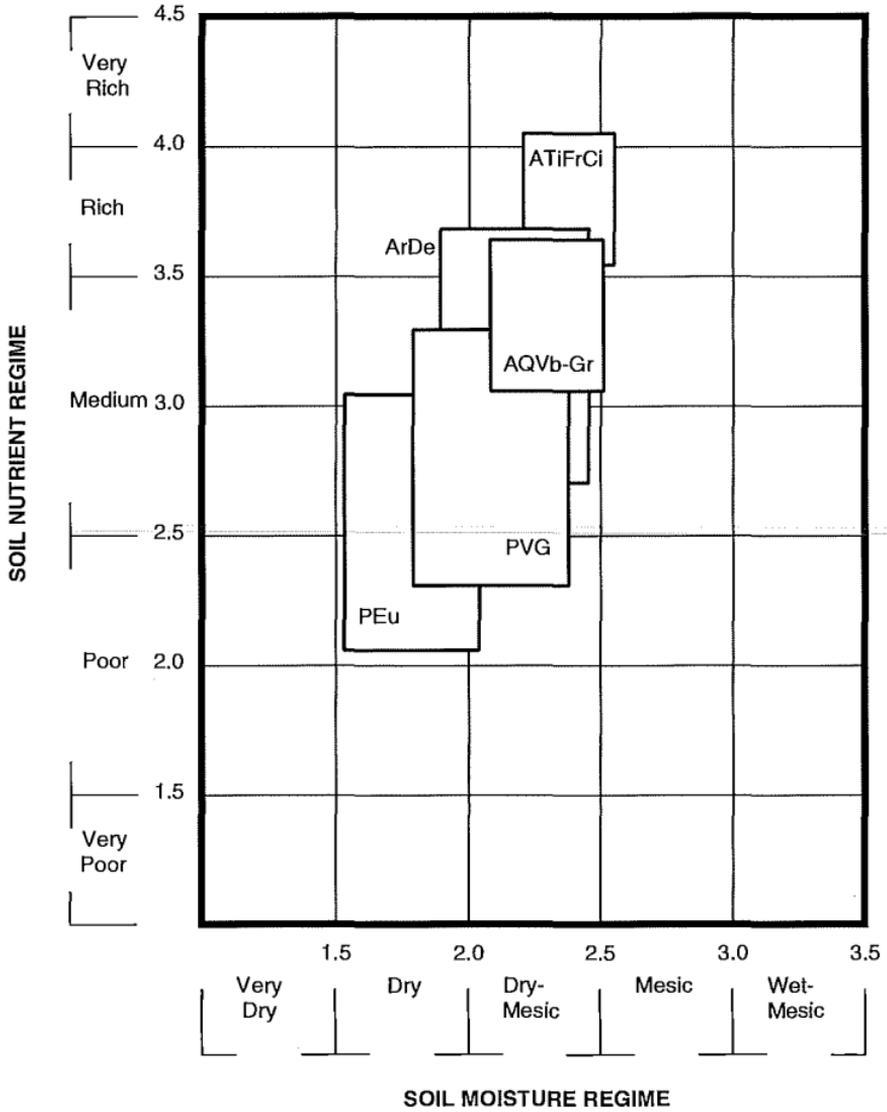
Comparison of Major Floristic Differences Between Closely Related Habitat Types of Region 9

		PEu	PVG
Euphorbia corollata	Flowering spurge	80	7
Amorpha canescens	Lead plant	58	2
Chimaphila umbellata	Pipsissewa	51	4
Fragaria vesca	Wood strawberry	38	2
Smilacina stellata	Star-flowered solomon's seal	33	9
Maianthemum canadense	Wild lily-of-the-valley	38	89
Gaultheria procumbens	Wintergreen	13	70
Smilax tamnoides	Bristly greenbrier	2	56
Aralia nudicaulis	Wild sarsaparilla	7	54
Anemone quinquefolia	Wood anemone	9	43
Mitchella repens	Partridgeberry	2	43
Trientalis borealis	Starflower	11	43
Dryopteris spinulosa	Spinulose shield fern	11	41
Ilex verticillata	Winterberry	7	39
Aronia melanocarpa	Black chokeberry	.	37
Lysimachia quadrifolia	Whorled loosestrife	9	35
Lycopodium obscurum	Ground-pine	.	30
		ArDe	AQVb-Gr
Pteridium aquilinum	Braken fern	63,6	33,1
Smilacina stellata	Star-flowered solomon's seal	49	.
Smilax herbacea	Carrion flower	38	.
Amorpha canescens	Lead plant	33	.
Viburnum acerifolium	Maple-leaved viburnum	8,1	100,12
Anemone quinquefolia	Wood anemone	17	100
Dryopteris spinulosa	Spinulose shield fern	14	92
Smilax tamnoides	Bristly greenbrier	11	92
Sanicula marilandica	Black snakeroot	9	92
Aster macrophyllus	Large-leaved aster	11	75
Phryma leptostachya	Lopseed	24	75
Thalictrum dioicum	Early meadow rue	9	75
Cornus alternifolia	Alternate-leaved dogwood	7	58
Mitchella repens	Partridgeberry	7	58
Trientalis borealis	Starflower	4	58
Viburnum raf.	Downy arrowwood	4	58
Hepatica americana	Round-lobed hepatica	3	58
Botrychium virginianum	Rattlesnake fern	5	50
		PVG	ArDe
Gaultheria procumbens	Wintergreen	70	.
Gaylussacia baccata	Black huckleberry	61,12	13,2
Smilax tamnoides	Bristly greenbrier	56	11
Mitchella repens	Partridgeberry	43	7
Trientalis borealis	Starflower	43	4
Amphicarpa bracteata	Hog peanut	4	72
Desmodium glutinosum	Pointed-lyd tick trefoil	7,1	66,4
Osmorhiza claytoni	Sweet cicely	15	63
Vitis riparia	Riverbank grape	11	51
Smilacina stellata	Star-flowered solomon's seal	9	49
Chimaphila umbellata	Pipsissewa	4	38

		ArDe	ATIFrCi
<i>Pteridium aquilinum</i>	Braken fern	64,6	9,1
<i>Polygonatum pubescens</i>	Hairy solomon's seal	51	.
<i>Smilacina stellata</i>	Star-flowered solomon's seal	49	18
<i>Chimaphila umbellata</i>	Pipsissewa	38	.
<i>Circaea quadrisulcata</i>	Enchanter's nightshade	22,1	100,7
<i>Geum canadense</i>	White avens	3	91
<i>Phryma leptostachya</i>	Lopseed	24	91
<i>Smilax herbacea</i>	Carrion flower	38	91
<i>Arisaema atrorubens</i>	Jack-in-the-pulpit	.	73
<i>Impatiens capensis</i>	Jewelweed	.	55
<i>Smilax tamnoides</i>	Bristly greenbrier	11	55
<i>Athyrium filix-femina</i>	Lady fern	8,1	45,8
<i>Botrychium virginianum</i>	Rattlesnake fern	5	45
<i>Solanum dulcamara</i>	Bittersweet nightshade	17	45

		ATIFrCi	AQVb-Gr
<i>Circaea quadrisulcata</i>	Enchanter's nightshade	100,7	33,1
<i>Geum canadense</i>	White avens	91	8
<i>Smilax herbacea</i>	Carrion flower	91	.
<i>Vitis riparia</i>	Riverbank grape	91	33
<i>Arisaema atrorubens</i>	Jack-in-the-pulpit	73	17
<i>Cornus racemosa</i>	Gray dogwood	73	8
<i>Carya ovata</i>	Shagbark hickory	64	8
<i>Solanum dulcamara</i>	Bittersweet nightshade	45	.
<i>Viburnum acerifolium</i>	Maple-leaved viburnum	18,1	100,12
<i>Dryopteris spinulosa</i>	Spinulose shield fern	9	92
<i>Sanicula marilandica</i>	Black snakeroot	18	92
<i>Aster macrophyllus</i>	Large-leaved aster	9,1	75,9
<i>Polygonatum pubescens</i>	Hairy solomon's seal	.	75
<i>Cornus alternifolia</i>	Alternate-leaved dogwood	9	58
<i>Desmodium nudiflorum</i>	Naked-flowered tick trefoil	9	58
<i>Hepatica americana</i>	Round-lobed hepatica	.	58
<i>Mitchella repens</i>	Partridgeberry	.	58
<i>Uvularia grandiflora</i>	Large-flowered bellwort	9	58
<i>Carpinus caroliniana</i>	American hornbeam	.	50
<i>Hamamelis virginiana</i>	Witch hazel	.	33

Relationship of Habitat Types to Soil Moisture and Nutrient Regimes in Region 9



PEu

Pinus strobus/Euphorbia corollata (White pine/Flowering spurge)

Distribution:

Throughout region 9, primarily Natural Subdivisions 4a and 4b.

Similar habitat types: PVG, PVGy (regions 6 and 7)

Landform and soils:

Level sand plains (lacustrine and outwash) with sandstone buttes and sometimes on rolling pitted outwash. Deep sands and loamy sands. **Very dry to dry, nutrient poor sites.**

Vegetation:

Common forest cover types:

Various mixtures of *pin oak*, *black oak*, *white oak*, *jack pine*, *red pine* or *white pine*. *Red oak* is conspicuously absent.

Shrub and small tree layer:

Most prominent shrub is *hazel*. Seedlings and saplings of *white oak*, *black cherry* and *red maple* often comprise the majority of coverage. *Huckleberry* and *blueberry* sometimes have high coverage, but their constancy is low. This is rather unusual, especially for *blueberry* which is normally the most conspicuous low shrub on sandy soils of all other regions.

Ground flora characteristics:

grasses, *sedges* and *bracken fern* are usually predominant ground cover. Other species have poor representation. With the exception of *grasses* and *sedges* only two herbaceous species had constancy values over 50% (*flowering spurge* and *false solomon's seal*). *Flowering spurge* and *lead plant* best distinguish PEu type from other dry, infertile habitat types.

Disturbance and succession:

In presettlement time PEu habitat type was dominated by a variety of community types apparently reflecting differences in fire regime. Prairie, pine barrens, oak barrens, oak savanna and oak forest were all represented.

It appears that even in the absence of fire all tree species present in current stands are capable of persisting on this site type. *White oak* is regenerating most successfully, but *black* and even *pin oak* show considerable presence in the understory. Where seed source exists *white pine* easily regenerates in mixed oak stands and must be considered a potential future dominant.

PEu

Understory species in order of decreasing constancy, with average coverage.

Scientific name	Common name	Constancy Coverage	
		%	%
Herbs			
Grasses spp.	Grasses	82	27.986
Euphorbia corollata	Flowering spurge	80	1.797
Smilacina racemosa	False solomon's seal	58	2.038
Chimaphila umbellata	Pipsissewa	51	2.183
Polygonatum pubescens	Hairy solomon's seal	44	1.655
Fragaria vesca	Wood strawberry	38	1.106
Maianthemum canadense	Wild lily-of-the-valley	38	3.982
Pteridium aquilinum	Braken fern	38	11.071
Sedges spp.	Sedges	36	7.012
Smilacina stellata	Star-flowered solomon's seal	33	1.267
Uvularia sessilifolia	Sessile-leaved bellwort	29	0.700
Parthenocissus quinquefolia	Virginia creeper	24	1.727
Pyrola spp.	Pyrolas	22	0.930
Apocynum androsaemifolium	Spreading dogbane	20	2.189
Apocynum medium	Intermediate dogbane	20	1.667
Shrubs			
Corylus spp.	Hazelnuts	87	9.851
Prunus virginiana	Chokecherry	73	2.503
Amelanchier spp.	Juneberry	69	1.990
Rubus spp.	Blackberries/raspberries	62	2.089
Amorpha canescens	Lead plant	58	1.908
Rosa spp.	Roses	53	1.375
Vaccinium angustifolium	Low sweet blueberry	53	5.658
Gaylussacia baccata	Black huckleberry	22	23.960
Tree Seedlings			
Quercus velut./ellip.	Scrub oak	98	3.391
Prunus serotina	Black cherry	93	4.657
Quercus alba	White oak	80	4.586
Acer rubrum	Red maple	73	1.788
Pinus strobus	White pine	49	2.627
Pinus banksiana	Jack pine	20	1.667
Salix spp.	Willow	20	1.933

PVG

Pinus/Vaccinium-Gaultheria (White pine/Blueberry-wintergreen)

Distribution:

Throughout region 9, primarily Natural Subdivisions 4a and 4b

Similar habitat types: PEu, PVGy (regions 6 and 7)

Landform and soils:

Level sand plains (lacustrine and outwash) with sandstone buttes and sometimes on rolling pitted outwash. Loamy sands and sandy loam over sand. In contrast to PEu ground water influence may be a factor. **Dry to dry-mesic, poor to medium nutrient sites.**

Vegetation:

Common forest cover types: Various mixtures of *pin oak*, *black oak*, *white oak*, *jack pine*, *red pine* or *white pine*. In contrast to PEu, *red oak* is sometimes present on PVG. *Red maple* is also better represented here.

Shrub and small tree layer: This layer is moderately well developed. Principal species are *red maple* and *black cherry* seedlings and saplings, *huckleberry*, *serviceberry*, *choke cherry*, *blackberries*, *blueberry* and *hazel*.

Ground flora characteristics: The herbaceous layer is some-

what better developed than it is on the PEu type, both in terms of species number and total coverage. Species with highest constancy and coverage values are: *bracken fern*, *wild lily-of-the-valley*, *sedges* and *grasses*, *sessile bellwort*, *false solomon's seal*, *wild sarsaparilla*, and *wood anemone*. In addition the following group of species with low to moderate constancy values distinguishes PVG from PEu type: *partridgeberry*, *starflower*, *spinulose shield fern*, *black chokeberry*, and *winterberry (Ilex)*.

Disturbance and succession:

In presettlement time PVG habitat type was dominated by a variety of community types apparently reflecting differences in fire regime. Prairie, pine barrens, oak barrens, oak savanna and oak forest were all represented. It appears that even in the absence of fire all tree species present in current stands are capable of persisting on this site type. *White oak* is regenerating most successfully, but *black* and even *pin oak* show considerable presence in the understory. Where seed source exists white pine easily regenerates in mixed oak stands and must be considered a potential future dominant.

PVG

Understory species in order of decreasing constancy, with average coverage.

Scientific name	Common name	Constancy Coverage	
		%	%
Herbs			
<i>Maianthemum canadense</i>	Wild lily-of-the-valley	89	2.938
<i>Pteridium aquilinum</i>	Braken fern	74	11.020
<i>Gaultheria procumbens</i>	Wintergreen	70	1.429
Sedges spp.	Sedges	69	2.065
Grasses spp.	Grasses	67	5.756
<i>Uvularia sessilifolia</i>	Sessile-leaved bellwort	63	1.400
<i>Smilacina racemosa</i>	False solomon's seal	59	1.253
<i>Smilax tamnoides</i>	Bristly greenbrier	56	0.913
<i>Aralia nudicaulis</i>	Wild sarsaparilla	54	1.855
<i>Anemone quinquefolia</i>	Wood anemone	43	0.591
<i>Mitchella repens</i>	Partridgeberry	43	2.496
<i>Trientalis borealis</i>	Starflower	43	0.448
<i>Dryopteris spinulosa</i>	Spinulose shield fern	41	2.668
<i>Apocynum androsaemifolium</i>	Spreading dogbane	37	0.565
<i>Lysimachia quadrifolia</i>	Whorled loosestrife	35	0.389
<i>Polygonatum pubescens</i>	Hairy solomon's seal	35	1.305
<i>Viola</i> spp.	Violets	35	0.768
<i>Lycopodium obscurum</i>	Ground-pine	30	0.712
<i>Rubus hispidus</i>	Swamp dewberry	26	0.521
<i>Osmunda claytoniana</i>	Interrupted fern	24	2.777
<i>Osmunda regalis</i>	Flowering fern	24	1.885
<i>Parthenocissus quinquefolia</i>	Virginia creeper	24	0.846
<i>Galium</i> spp.	Bedstaws	22	1.200
<i>Rhus radicans</i>	Poison ivy	22	0.950
<i>Aster macrophyllus</i>	Large-leaved aster	20	2.864
<i>Pyrola</i> spp.	Pyrolas	20	0.545
Shrubs			
<i>Amelanchier</i> spp.	Juneberry	96	3.275
<i>Vaccinium angustifolium</i>	Low sweet blueberry	93	2.798
<i>Corylus</i> spp.	Hazelnuts	74	3.560
<i>Rubus</i> spp.	Blackberries/raspberries	63	2.050
<i>Gaylussacia baccata</i>	Black huckleberry	61	11.964
<i>Prunus virginiana</i>	Chokecherry	52	2.275
<i>Ilex verticillata</i>	Winterberry	39	1.300
<i>Aronia melanocarpa</i>	Black chokeberry	37	0.450
<i>Diervilla lonicera</i>	Bush honeysuckle	22	0.592
<i>Rhamnus alnifolia</i>	Alder-leaved buckthorn	22	2.000
<i>Ribes</i> spp.	Gooseberries	20	0.145

Scientific name	Common name	Constancy %	Coverage %
Tree Seedlings			
Acer rubrum	Red maple	98	3.006
Quercus alba	White oak	91	2.251
Prunus serotina	Black cherry	89	3.148
Pinus strobus	White pine	59	1.928
Quercus velut./ellip.	Scrub oak	50	1.004
Quercus rubra	Northern red oak	35	1.832
Ulmus spp	Elms	28	0.813
Populus tremuloides	Trembling aspen	26	1.179
Populus grandidentata	Bigtooth aspen	22	0.950

ArDe

Acer rubrum/*Desmodium* Community Type (Red maple/Pointed-leaf tick trefoil)

Distribution:

Throughout region 9, more frequently in Natural Subdivision 4b than in 4a.

Similar habitat types: ArDe-V (regions 6 and 7)

Landform and soils:

Nearly level to slightly rolling outwash plains. Soils are somewhat more loamy (e.g. sandy loam) than those of closely associated PVG and PEu types. **Dry to dry-mesic/medium nutrient sites.**

Vegetation:

Common forest cover types:

Red oak-white oak mixtures are most common. *Pin oak* and *black oak* are often present but do not dominate. *Red maple* and *black cherry* are common associates and usually constitute most of the reproduction. *Shagbark hickory* is also frequently present and is reproducing. *White pine* is rare.

Shrub and small tree layer:

Shrub layer is usually well developed and consists of *black cherry*, *choke cherry*, *blackberries*, *hazel*, and *service berry*.

Ground flora characteristics:

Collectively, the following group of species clearly distinguish ArDe type from dryer, less fertile types in this region: *Sweet cicely*, *pointed-leaf tick trefoil*, *hog peanut*, *riverbank grape*, and *Virginia creeper*. Also noteworthy is general absence of *wintergreen*, *huckleberry*, and *blueberry*.

Disturbance and succession:

Soil characteristics and understory composition suggest nearly ideal conditions for *white pine* dominance on this type. However, due to lack of abundant seed source *white pine* is not well represented in current stands. The most shade tolerant species currently reproducing is *red maple*, thus the community type bears its name. However, it appears that *white pine* could become established as a dominant overstory species with continued exclusion of fire. Planting of *white pine* to establish seed source could also accelerate the process.

ArDe

Understory species in order of decreasing constancy, with average coverage.

Scientific name	Common name	Constancy Coverage	
		%	%
Herbs			
<i>Smilacina racemosa</i>	False solomon's seal	79	1.983
<i>Amphicarpa bracteata</i>	Hog peanut	72	4.473
Grasses spp.	Grasses	70	11.868
<i>Desmodium glutinosum</i>	Pointed-leaved tick trefoil	66	4.198
<i>Osmorhiza claytoni</i>	Sweet cicely	63	1.588
<i>Pteridium aquilinum</i>	Braken fern	63	6.117
<i>Parthenocissus quinquefolia</i>	Virginia creeper	59	2.389
<i>Viola</i> spp.	Violets	54	0.722
<i>Polygonatum pubescens</i>	Hairy solomon's seal	51	1.708
<i>Vitis riparia</i>	Riverbank grape	51	2.444
<i>Pyrola</i> spp.	Pyrolas	49	1.686
<i>Smilacina stellata</i>	Star-flowered solomon's seal	49	1.495
<i>Galium</i> spp.	Bedstaws	43	2.055
<i>Maianthemum canadense</i>	Wild lily-of-the-valley	43	2.488
<i>Geranium</i> spp.	Geranium	41	2.458
<i>Chimaphila umbellata</i>	Pipsissewa	38	1.672
<i>Rhus radicans</i>	Poison ivy	38	5.010
<i>Smilax herbacea</i>	Carrion flower	38	0.976
Sedges spp.	Sedges	36	3.904
<i>Fragaria vesca</i>	Wood strawberry	34	0.815
<i>Aralia nudicaulis</i>	Wild sarsaparilla	33	4.820
<i>Apocynum medium</i>	Intermediate dogbane	32	1.900
<i>Uvularia sessilifolia</i>	Sessile-leaved bellwort	30	0.596
<i>Geranium maculatum</i>	Wild geranium	29	1.559
<i>Helianthus divaricatus</i>	Woodland sunflower	28	2.086
<i>Helianthus</i> spp.	Sunflowers	28	0.619
<i>Phryma leptostachya</i>	Lopseed	24	0.833
<i>Circaea quadrisulcata</i>	Enchanter's nightshade	22	1.018
<i>Galium asprellum</i>	Cleavers	22	0.394
<i>Asclepias</i> spp.	Milkweeds	21	1.288
<i>Prenanthes alba</i>	White lettuce	21	0.319
<i>Apocynum androsaemifolium</i>	Spreading dogbane	20	0.393
<i>Euphorbia corollata</i>	Flowering spurge	20	0.880
Shrubs			
<i>Rubus</i> spp.	Blackberries/raspberries	92	5.007
<i>Prunus virginiana</i>	Chokecherry	83	3.624
<i>Corylus</i> spp.	Hazelnuts	80	9.851
<i>Amelanchier</i> spp.	Juneberry	74	1.720
<i>Amorpha canescens</i>	Lead plant	33	1.152
<i>Rosa</i> spp.	Roses	47	1.275
<i>Vaccinium angustifolium</i>	Low sweet blueberry	36	1.700
<i>Cornus</i> spp.	Dogwoods	32	4.100
<i>Cornus racemosa</i>	Gray dogwood	28	3.886

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Scientific name	Common name	Constancy Coverage	
		%	%
Tree Seedlings			
Prunus serotina	Black cherry	97	4.673
Quercus alba	White oak	96	3.096
Acer rubrum	Red maple	78	2.720
Quercus rubra	Northern red oak	53	1.833
Pinus strobus	White pine	39	4.020
Quercus velut./ellip.	Scrub oak	39	2.293
Ulmus spp	Elms	33	0.376
Carya ovata	Shagbark hickory	32	1.154
Acer negundo	Box elder	24	2.461

AQVb-Gr

Acer Saccharum-Quercus/Viburnum acerifolium *habitat type, Geranium maculatum variant* (Sugar maple-oak/maple-leaf viburnum; Wild geranium variant)

Distribution:

Eastern Portage county and throughout Waupaca county. Primarily Natural Subdivision 4b .

Similar types: AQVb (Region 5)

Landform and soils:

Typically on ice-contact topography (recessional, or disintegration moraines, pitted outwash). Soil is typically sandy loam or loamy sand if subsoil is till. **Dry-mesic/ medium nutrient sites.**

Vegetation:

Common forest cover types: *Red oak*, *white oak* and *red maple* share dominance in most stands. *White pine* was found in about half of the stands. *White ash*, *basswood* and *sugar maple* are sometimes present. *Shagbark hickory* is not a member of this type.

Shrub and small tree layer: Maple-leaved viburnum is typically the most common shrub. *Witch hazel* is less common than it is on the **AQVb** type NW of region 9. Other frequently present shrubs are *black cherry*, *service berry*, *alternate-leaved dogwood* and *red elderberry*. *Poison ivy* often has very high coverage.

Ground flora characteristics: Species with highest constancy and average coverage values are: *Hog peanut*, *big-leaf aster*, *meadow rue*, *sweet cicely*, *pointed-leaf tick trefoil* and *wild geranium*.

Disturbance and succession: **AQVb-Gr** is a variant of a plant association that occurs with somewhat different floristic composition in every glaciated part of the state, particularly north of the floristic tension zone. It is most often associated with ice-contact geology that gives rise to **dry-mesic/ medium nutrient** conditions. Records of presettlement vegetation show that white pine was usually a major if not dominant component. *Red oak*, *red maple* and often *basswood*, *white ash* and *sugar maple* were present as a second canopy. Past logging and fires have practically eliminated *white pine* and usually the mesic hardwoods. Thus, most current stands are dominated by *red oak* and *red maple*, with frequent admixtures of aspen and paper birch. **AQVb** sites appear to be sub-optimal for *sugar maple* growth, thus oak competes more successfully here than it does on more mesic sites. However, in absence of disturbance and without management tolerant mesic hardwoods would probably dominate this type.

AQVb-Gr

Understory species in order of decreasing constancy, with average coverage.

Scientific name	Common name	Constancy Coverage	
		%	%
Herbs			
<i>Amphicarpa bracteata</i>	Hog peanut	100	7.475
<i>Anemone quinquefolia</i>	Wood anemone	100	0.350
<i>Osmorhiza claytoni</i>	Sweet cicely	100	1.317
Sedges spp.	Sedges	100	2.358
<i>Dryopteris spinulosa</i>	Spinulose shield fern	92	1.900
<i>Geranium maculatum</i>	Wild geranium	92	0.682
<i>Sanicula marilandica</i>	Black snakeroot	92	0.236
<i>Smilax tamnoides</i>	Bristly greenbrier	92	0.464
<i>Desmodium glutinosum</i>	Pointed-leaved tick trefoil	83	5.870
<i>Aster macrophyllus</i>	Large-leaved aster	75	8.911
<i>Phryma leptostachya</i>	Lopseed	75	0.589
<i>Polygonatum pubescens</i>	Hairy solomon's seal	75	0.544
<i>Thalictrum dioicum</i>	Early meadow rue	75	1.289
<i>Viola</i> spp.	Violets	75	0.267
Grasses spp.	Grasses	67	1.137
<i>Smilacina racemosa</i>	False solomon's seal	67	0.837
<i>Aralia nudicaulis</i>	Wild sarsaparilla	58	9.986
<i>Desmodium nudiflorum</i>	Naked-flowered tick trefoil	58	1.629
<i>Hepatica americana</i>	Round-lobed hepatica	58	1.214
<i>Mitchella repens</i>	Partridgeberry	58	0.800
<i>Parthenocissus quinquefolia</i>	Virginia creeper	58	2.857
<i>Trientalis borealis</i>	Starflower	58	0.457
<i>Uvularia grandiflora</i>	Large-flowered bellwort	58	0.657
<i>Botrychium virginianum</i>	Rattlesnake fern	50	0.750
<i>Maianthemum canadense</i>	Wild lily-of-the-valley	50	0.517
<i>Rhus radicans</i>	Poison ivy	50	15.400
<i>Uvularia sessilifolia</i>	Sessile-leaved bellwort	50	0.267
<i>Actaea</i> spp.	Baneberries	42	0.100
<i>Galium triflorum</i>	Sweet-scented bedstraw	42	0.880
<i>Pyrola</i> spp.	Pyrolas	42	0.200
<i>Circaea quadrisulcata</i>	Enchanter's nightshade	33	0.950
<i>Trillium</i> spp.	Trilliums	33	0.475
<i>Pteridium aquilinum</i>	Braken fern	33	1.675
<i>Viola pubescens</i>	Downy yellow violet	33	0.100
<i>Vitis riparia</i>	Riverbank grape	33	0.600
<i>Apocynum androsaemifolium</i>	Spreading dogbane	25	0.267
<i>Asclepias</i> spp.	Milkweeds	25	0.267
<i>Aster sagittifolius</i>	Arrow-leaved aster	25	0.100
<i>Athyrium filix-femina</i>	Lady fern	25	1.067
<i>Lycopodium lucidulum</i>	Shining club-moss	25	0.433
<i>Monotropa uniflora</i>	Indian pipe	25	0.100
<i>Ranunculus abortivus</i>	Small-flowered crowfoot	25	0.100

Scientific name	Common name	Constancy Coverage	
		%	%
Shrubs			
<i>Viburnum acerifolium</i>	Maple-leaved viburnum	100	12.108
<i>Rubus</i> spp.	Blackberries/raspberries	83	0.880
<i>Amelanchier</i> spp.	Juneberry	75	0.967
<i>Prunus virginiana</i>	Chokecherry	75	2.244
<i>Corylus</i> spp.	Hazelnuts	67	5.988
<i>Ribes</i> spp.	Gooseberries	67	2.813
<i>Cornus alternifolia</i>	Alternate-leaved dogwood	58	0.243
<i>Viburnum rafinesquianum</i>	Downy arrowwood	58	2.371
<i>Sambucus canadensis</i>	Common elder	50	9.383
<i>Diervilla lonicera</i>	Bush honeysuckle	42	0.780
<i>Hamamelis virginiana</i>	Witch hazel	33	12.000
<i>Rosa</i> spp.	Roses	33	0.100
<i>Vaccinium angustifolium</i>	Low sweet blueberry	25	0.267
Tree Seedlings			
<i>Acer rubrum</i>	Red maple	100	0.267
<i>Prunus serotina</i>	Black cherry	100	0.792
<i>Pinus strobus</i>	White pine	58	1.143
<i>Quercus alba</i>	White oak	58	0.171
<i>Quercus rubra</i>	Northern red oak	58	0.171
<i>Carpinus caroliniana</i>	American hornbeam	50	3.067
<i>Fraxinus americana</i>	White ash	50	8.117
<i>Populus grandidentata</i>	Bigtooth aspen	50	0.350
<i>Acer saccharum</i>	Sugar maple	42	0.680
<i>Crataegus</i> spp.	Hawthorns	42	0.780
<i>Ostrya virginiana</i>	Ironwood	42	3.860
<i>Ulmus</i> spp.	Elms	33	0.100
<i>Quercus velut./ellip.</i>	Scrub oak	25	0.100
<i>Tilia americana</i>	Basswood	25	1.400

ATiFrCi

Acer saccharum-Tilia-Fraxinus/Circaea quadrisulcata community type (Sugar maple-basswood-white ash/ Enchanter's nightshade)

Distribution:

Primarily in the glaciated part of the region, Natural Subdivisions 4b and 5c.

Similar types: ArCi (Region 6), ArCi-Ph (Region 7)

Landform and soils:

The glaciated portion of habitat type region 9 is characterized by complex mixtures or juxtapositions of greatly differing glacial deposits. **ATiFrCi** type is found where soil parent material is more loamy than is typical for pitted outwash, or where particle size stratification results in increased moisture in the profile. Based on vegetative characteristics this type is classified as **dry-mesic/nutrient rich**.

Vegetation:

Common forest cover types: *White oak* and *red maple* are most common dominants. Important associates, at least in some stands, are *shagbark hickory*, *white ash* and *basswood*. *Sugar maple* is sometimes present. In region 9, all species listed here, except *oak* and *red maple* occur only on **ATiFrCi** and **AQVb-Gr** types.

Shrub and small tree layer:

Shrub layer is relatively well developed and consists of *black cherry*, *choke cherry*, *hazel* and *serviceberry*.

Ground flora characteristics:

The most common species are: *Pointed-leaf tick trefoil*, *enchanter's nightshade*, *sweet cicely*, *Virginia creeper*, *riverbank grape*, and *wild geranium*. Communities on this type also contain several species that are absent or uncommon on other habitat types in region 9 (except for **AQVb-Gr**). Some of these are: *White avens*, *jack-in-the-pulpit*, *touch-me-not*, *lopseed*, *enchanter's nightshade*, *carrion flower*, *bristly greenbrier*, *rattlesnake fern*, and *lady fern*.

Disturbance and succession:

It is almost certain that current species composition on this type is the result of past fire disturbance. Soil characteristics and understory flora suggest that tolerant mesic hardwoods are well suited to this type and are currently absent only because of lack of adequate seed source. For this reason this community type was placed into *sugar maple* habitat type series.

ATiFrCi

Understory species in order of decreasing constancy, with average coverage.

Scientific name	Common name	Constancy Coverage	
		%	%
Herbs			
<i>Circaea quadrisulcata</i>	Enchanter's nightshade	100	7.10
<i>Desmodium glutinosum</i>	Pointed-leaved tick trefoil	100	4.86
<i>Geum canadense</i>	White avens	91	1.17
<i>Parthenocissus quinquefolia</i>	Virginia creeper	91	6.83
<i>Phryma leptostachya</i>	Lopseed	91	0.93
Sedges spp.	Sedges	91	0.74
<i>Smilax herbacea</i>	Carrion flower	91	0.78
<i>Vitis riparia</i>	Riverbank grape	91	0.40
<i>Galium asprellum</i>	Cleavers	82	0.38
<i>Geranium maculatum</i>	Wild geranium	82	2.73
<i>Osmorhiza claytoni</i>	Sweet cicely	82	2.41
<i>Amphicarpa bracteata</i>	Hog peanut	73	4.74
<i>Arisaema atrorubens</i>	Jack-in-the-pulpit	73	0.77
<i>Uvularia sessilifolia</i>	Sessile-leaved bellwort	73	0.22
<i>Viola</i> spp.	Violets	73	1.25
<i>Smilacina racemosa</i>	False solomon's seal	64	0.39
<i>Aster lateriflorus</i>	Calico or starved aster	55	0.52
<i>Galium boreale</i>	Northern bedstraw	55	0.18
<i>Impatiens capensis</i>	Jewelweed	55	0.67
<i>Smilax tamnoides</i>	Bristly greenbrier	55	0.35
<i>Athyrium filix-femina</i>	Lady fern	45	7.32
<i>Botrychium virginianum</i>	Rattlesnake fern	45	0.30
<i>Maianthemum canadense</i>	Wild lily-of-the-valley	45	0.40
<i>Potentilla simplex</i>	Common cinquefoil	45	0.30
<i>Solanum dulcamara</i>	Bittersweet nightshade	45	0.10
<i>Solidago</i> spp.	Goldenrods	45	0.30
<i>Anemone quinquefolia</i>	Wood anemone	36	0.35
<i>Apocynum androsaemifolium</i>	Spreading dogbane	36	0.10
<i>Aralia nudicaulis</i>	Wild sarsaparilla	36	1.20
<i>Prenanthes alba</i>	White lettuce	36	0.10
<i>Thalictrum dioicum</i>	Early meadow rue	36	2.27
<i>Trientalis borealis</i>	Starflower	36	0.10
<i>Actaea</i> spp.	Baneberries	27	1.23
<i>Arctium minus</i>	Common burdock	27	0.27
<i>Fragaria vesca</i>	Wood strawberry	27	0.27
<i>Helianthus</i> spp.	Sunflowers	27	0.27
<i>Heuchera richardsonii</i>	Rough heuchera	27	0.10
<i>Laportea canadensis</i>	Wood nettle	27	1.23
Shrubs			
<i>Corylus</i> spp.	Hazelnuts	82	4.22
<i>Cornus racemosa</i>	Gray dogwood	73	0.89
<i>Rubus</i> spp.	Blackberries/raspberries	73	1.97
<i>Prunus virginiana</i>	Chokecherry	64	4.57
<i>Ribes</i> spp.	Gooseberries	64	0.87
<i>Amelanchier</i> spp.	Juneberry	55	9.47

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Scientific name	Common name	Constancy Coverage	
		%	%
<i>Ilex verticillata</i>	Winterberry	36	1.07
<i>Sambucus canadensis</i>	Common elder	27	0.10
<i>Xanthoxylum americanum</i>	Prickly ash	27	11.00
Tree Seedlings			
<i>Acer rubrum</i>	Red maple	91	0.25
<i>Prunus serotina</i>	Black cherry	82	0.91
<i>Ulmus</i> spp	Elms	82	0.59
<i>Quercus alba</i>	White oak	73	0.53
<i>Quercus rubra</i>	Northern red oak	73	0.10
<i>Carya ovata</i>	Shagbark hickory	64	0.93
<i>Tilia americana</i>	Basswood	64	0.17
<i>Fraxinus americana</i>	White ash	55	1.72
<i>Acer negundo</i>	Box elder	36	0.82

Occurrence of Tree Species on Habitat Types of the Region 9

Size classes: SE - seedlings; SA - saplings; MT - medium trees (4-10" DBH);
LT - large trees (>10" DBH). Numbers are frequency of occurrence: * <10%;
1, 10-25%; 2, 26-50%; 3, 51-75%; 4, 76-100%. Letters are coverage classes:
A <5%; B 5-15%; C 16-35%; D >35%.

	PEu				PVG				ArDe				ATIFrCi				AQVb-Gr				
	SE	SA	MT	LT	SE	SA	MT	LT	SE	SA	MT	LT	SE	SA	MT	LT	SE	SA	MT	LT	
Jack pine	*	1A	1B	*	*		*	*			*	*									
Bur oak	*	1A	*	*		*	*	*			*	1B	*		*						
Northern pin oak	1A	2B	3C	3C	1A	1B	2C	2D	*	*	1C	1C			*	*		*			
Trembling aspen	*	*	*		1A	*		*	*	*	*	*	*		*		*				
Bigtooth aspen	*	1A	*	*	1A	*	1B	1B	*	*	*	*						2A	1A	2B	2C
Red pine			*		*	*	*	*			*	*								*	2B
Black oak	*	1B	2C	3C	*	*	*	1D	*	1B	1C	2C		*	1A	2B				*	
Black walnut																					
Paper birch					*	*	1B	*					*							*	
Black ash					*	*	*														
Northern red oak		*	*	*	1A	1A	1B	1C	1A	2B	2C	2D	2A	*	1A	2C	2A	1B	2B	2D	
White pine	*	2B	2B	1C	1A	2B	2B	2C	*	2B	1B	1C						1A	2B	3C	
White oak	1B	3B	3C	2C	2A	2B	2B	3C	2A	3B	3C	3C	2A	2C	3B	4C	2A	1A	1B	3B	
Butternut					*				*	*	*		*								
Swamp white oak																					
Shagbark hickory		*			*	*			1A	1B	1B	*	3A	2A	2B	2B	*				
Black cherry	1B	4B	1B		3A	2B	1B		2B	4B	2B	*	4A	3B	2B	2B	4A	2A	1B		
Box elder	*	*							1A	1B	*		2A	2A	1B		1A				
Hackberry																					*
Elms	*	*	*		*	*	*	*	1A	1A			3A	3B	2B	*	*				
American elm									*	*											
White ash	*	*	*		*	*	*	*	*	*	*	*		3A	2B	2B	2C	2B	2B	1B	*
Green ash																					
Yellow birch						*	*														
Bitternut hickory	*	*			*				*	*	*		*					*	*		
Red maple	1A	2B	*	*	2A	4C	4C	3C	2A	2B	2B	1B	3A	3B	3C	3C	2A	4C	4D	3C	
American hornbeam					*	*												2A	2A		
Ironwood					*	*			*	*	*				1C		2A	2C	1B		
Basswood		*	*			*	*	*	*	*	*	*	3A	2C	2C	2C	1A	1A	*		
Eastern hemlock							*														1B
American beech																					
Sugar maple																		2A	1C	1B	*

Understory Species with Potential Diagnostic Value for Distinguishing among the Habitat Types of Region 9

Numbers represent frequency of occurrence classes: * 10-25%; 1, 26-50%; 2, 51-75%; 3, 76-100%. Letters are coverage classes: A<5%; B 6-15%; C>15%.

Scientific Name	Common Name	PEu	PVG	ArDe	ATIFrCi	AQVb-Gr
Herbs						
<i>Lycopodium obscurum</i>	Ground-pine		1 A			
<i>Lysimachia quadrifolia</i>	Whorled loosteife		1 A			
<i>Rubus hispidus</i>	Swamp dewberry		1 A			
<i>Euphorbia corollata</i>	Flowering spurge	3 A		*		
<i>Chimaphila umbellata</i>	Pipsissewa	2 A		1 A		
<i>Apocynum medium</i>	Intermediate dogbane	*		1 A		
<i>Smilacina stellata</i>	Star-flwd. solomon's seal	1 A		1 A	*	
<i>Fragaria vesca</i>	Wood strawberry	1 A		1 A	1 A	
<i>Gaultheria procumbens</i>	Wintergreen	*	2 A			
<i>Prenanthes alba</i>	White lettuce	*	*	*	1 A	
<i>Pteridium aquilinum</i>	Braken fern	1 B	2 B	2 B		1 A
<i>Polygonatum pubescens</i>	Hairy solomon's seal	1 A	1 A	2 A		2 A
<i>Pyrola</i> spp.	Pyrolas	*	*	1 A		1 A
<i>Rhus radicans</i>	Poison ivy	*	*	1 B		1 C
<i>Dryopteris spinulosa</i>	Spinulose shield fern	*	1 A	*		3 A
<i>Smilacina racemosa</i>	False solomon's seal	2 A	2 A	3 A	2 A	2 A
<i>Maianthemum canadense</i>	Wild lily-of-the-valley	1 A	3 A	1 A	1 A	1 A
<i>Uvularia sessilifolia</i>	Sessile-leaved bellwort	1 A	2 A	1 A	2 A	1 A
<i>Vitis riparia</i>	Riverbank grape	*	*	2 A	3 A	1 A
<i>Apocynum androsaemifolium</i>	Spreading dogbane	*	1 A	*	1 A	*
<i>Trientalis borealis</i>	Starflower	*	1 A	*	1 A	2 A
<i>Smilax tamnoides</i>	Bristly greenbrier		2 A	*	2 A	3 A
<i>Anemone quinquefolia</i>	Wood anemone		1 A	*	1 A	3 A
<i>Aralia nudicaulis</i>	Wild sarsaparilla		2 A	1 A	1 A	2 B
<i>Desmodium glutinosum</i>	Pointed-lvd. tick trefoil			2 A	3 A	3 B
<i>Circaea quadrisulcata</i>	Enchanter's nightshade			*	3 B	1 A
<i>Desmodium nudiflorum</i>	Naked-flwd. tick trefoil			*		2 A
<i>Aralia racemosa</i>	Spikenard				*	*
<i>Aster macrophyllus</i>	Large-leaved aster		*	*		2 B
<i>Geranium maculatum</i>	Wild geranium		*	1 A	3 A	3 A
<i>Osmorhiza claytoni</i>	Sweet cicely		*	2 A	3 A	3 A
<i>Mitchella repens</i>	Partridgeberry		1 A			2 A
<i>Smilax herbacea</i>	Carrion flower		*	1 A	3 A	
<i>Galium asprellum</i>	Cleavers		*	*	3 A	*
<i>Helianthus divaricatus</i>	Woodland sunflower			1 A		
<i>Solanum dulcamara</i>	Bittersweet nightshade			*	1 A	
<i>Galium boreale</i>	Northern bedstraw			*	2 A	
<i>Amphicarpa bracteata</i>	Hog peanut			2 A	2 A	3 B
<i>Phryma leptostachya</i>	Lopseed			*	3 A	2 A
<i>Geum canadense</i>	White avens				3 A	
<i>Potentilla simplex</i>	Common cinquefoil				1 A	
<i>Impatiens capensis</i>	Jewelweed				2 A	
<i>Laportea canadensis</i>	Wood nettle				1 A	
<i>Heuchera richardsonii</i>	Rough heuchera				1 A	

Scientific Name	Common Name	ATiCr(O)	ATiCr(As)	ATiAs(De)	ATiH	
<i>Aster lateriflorus</i>	Calico or starved aster			2 A		
<i>Botrychium virginianum</i>	Rattlesnake fern			1 A	1 A	
<i>Sanicula marilandica</i>	Black snakeroot			*	3 A	
<i>Actaea</i> spp.	Baneberries			1 A	1 A	
<i>Arisaema atrorubens</i>	Jack-in-the-pulpit			2 A	*	
<i>Thalictrum dioicum</i>	Early meadow rue			1 A	2 A	
<i>Athyrium filix-femina</i>	Lady fern		*	1 B	*	
<i>Uvularia grandiflora</i>	Large-flowered bellwort				2 A	
<i>Viola pubescens</i>	Downy yellow violet				1 A	
<i>Trillium</i> spp.	Trilliums				1 A	
<i>Galium triflorum</i>	Sweet-scent. bedstraw				1 A	
<i>Hepatica americana</i>	Round-lobed hepatica				2 A	
Shrubs						
<i>Aronia melanocarpa</i>	Black chokeberry		1 A			
<i>Amorpha canescens</i>	Lead plant	2 A		1 A		
<i>Gaylussacia baccata</i>	Black huckleberry	*	2 B	*		
<i>Cornus racemosa</i>	Gray dogwood	*	*	1 A	2 A	
<i>Amelanchier</i> spp.	Juneberry	2 A	3 A	2 A	2 B	2 A
<i>Prunus virginiana</i>	Chokecherry	2 A	2 A	3 A	2 A	2 A
<i>Vaccinium angustifolium</i>	Low sweet blueberry	2 B	3 A	1 A	*	*
<i>Ilex verticillata</i>	Winterberry		1 A	*	1 A	*
<i>Xanthoxylum americanum</i>	Prickly ash			*	1 B	*
<i>Viburnum rafinesquianum</i>	Downy arrowwood				*	2 A
<i>Sambucus canadensis</i>	Common elder				1 A	1 B
<i>Viburnum acerifolium</i>	Maple-leaved viburnum		*		*	3 B
<i>Diervilla lonicera</i>	Bush honeysuckle		*			1 A
<i>Cornus alternifolia</i>	Alt.-leaved dogwood		*			2 A
<i>Hamamelis virginiana</i>	Witch hazel					1 B
<i>Crataegus</i> spp.	Hawthorns					1 A

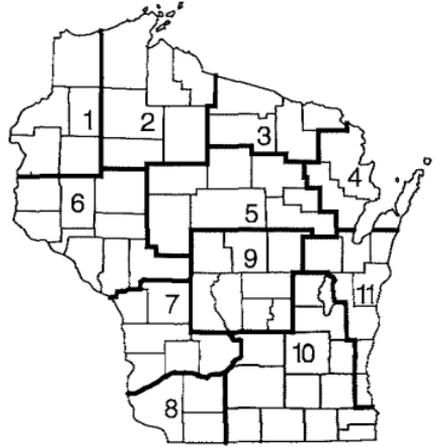
Region 10

Extent, topography, geology and soils

Region 10 encompasses 13 counties, comprising the major portion of SE Wisconsin. It extends from the western borders of the tier of counties along Lake Michigan west, to include Winnebago, Fond du Lac, Columbia, Dane and Green counties. Over 90 percent of the region is within the natural division 5. Only the extreme western portions of Dane and Green counties extend into subdivision 6, which is part of the driftless region.

Natural division 5 is characterized on the east by a series of morainic ridges paralleling Lake Michigan, including the Kettle Moraine complex. Prominent in the south are terminal moraines, sandy outwash and older ground moraine. The northern margin is characterized by extensive glacio-fluvial deposits, while ground moraine and drumlin fields occupy the large central section.

Glacial deposits over most of the region are covered with one to three feet of loess (wind-blown silt) which largely negates the potential differences in soil parent material. Thus, soils in this region are predominantly nutrient-rich loams and silt loams with high moisture holding capacity.



Forest vegetation

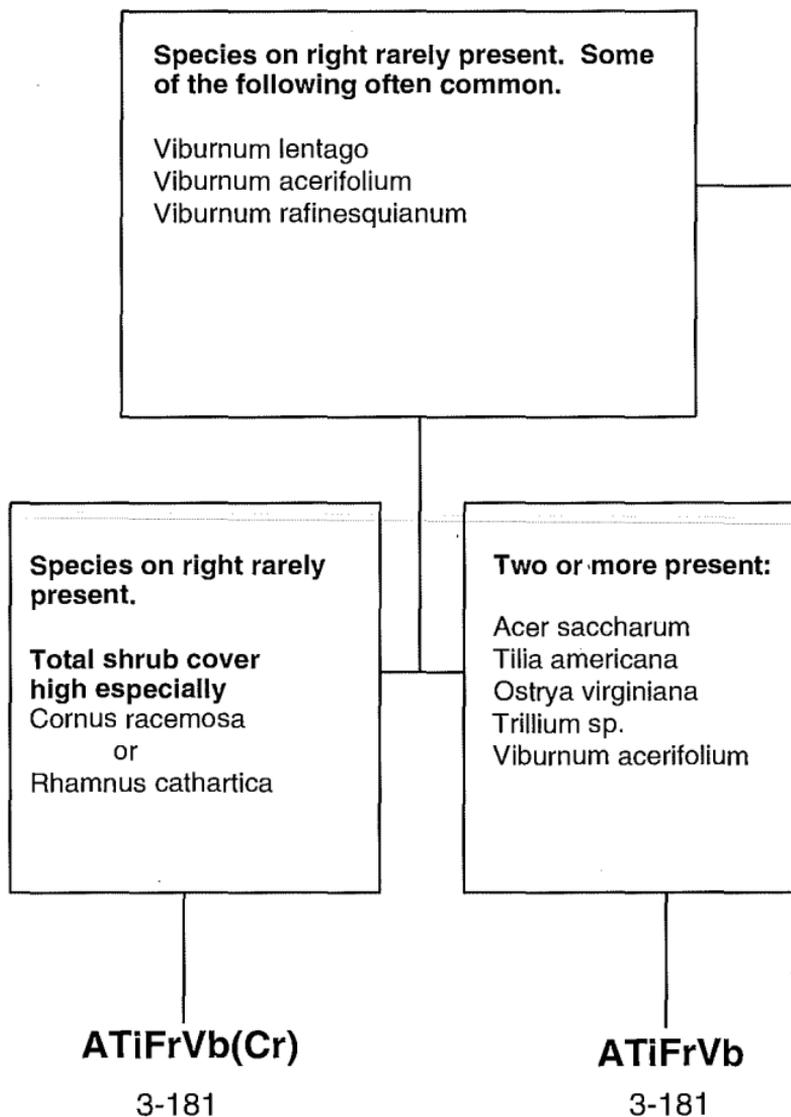
The combination of Wisconsin climate and soil conditions described above clearly favor the development of mesic deciduous forests. However, differences in fire regimes historically resulted in many types of vegetation communities, including prairie, oak savanna, oak opening, oak forest and sugar maple-basswood-white ash dominated southern mesic forest. Natural subdivision 5b was delineated entirely on the basis of presence of southern mesic forest in presettlement time. Soils within this subdivision do not differ from those of surrounding area in any way that could account for differences in forest composition. (Major soil series are Theresa, Dodge and Miami). Dominance of sugar maple, basswood and white ash was attained in protected loca-

tions such as those lying leeward of rivers, lakes and wetlands that served as fire breaks. In Jefferson county, for example, the Bark River on the south and Crawfish River on the west shielded the mesic forest from fires that maintained savanna elsewhere.

Natural subdivision 5c represents those parts of region 9 where fires in presettlement time

maintained oak forests, oak savannas, oak openings and prairies. Most of this area is currently in agriculture. However, scattered woodlands remain. The composition of current stands depends largely on the time that had elapsed since disturbance and on proximity of seed sources of mesic hardwoods.

Key to Habitat Types of Region 10 - Scientific Names



Group below well represented: Several species are found rather than any one being common.

Poorly represented: Usually no more than one species from the group present. Abundance may be low or high.

Two or more present:

Viola pensylvanica
Phryma leptostachya
Sanguinaria canadensis
Osmorhiza claytoni
Botrychium virginianum
Hydrophyllum virginianum
Caulophyllum thalictroides

Sanicula sp.
Galium aparine

Two or more present:

Osmorhiza claytoni
Phryma leptostachya
Botrychium virginianum
Desmodium sp.
Sanicula sp.
Cornus racemosa
Rosa sp.

Group on left poorly represented or any of the following present:

Acer saccharum
Tilia americana
Fraxinus americana

ATiFrCa(O)

3-185

ATiFrCa

3-185

Key to Habitat Types of Region 10 - Common Names

Species on right rarely present. Some of the following often common.

Nannyberry
Maple-leaved Viburnum
Downy Arrowwood

Species on right rarely present.

Total shrub cover high especially
Gray Dogwood
or
Buckthorn

ATiFrVb(Cr)

3-181

Two or more present:

Sugar maple
Basswood
Ironwood
Trilliums
Maple-leaved Viburnum

ATiFrVb

3-181

Group below well represented: Several species are found rather than any one being common.

Poorly represented: Usually no more than one species from the group present. Abundance may be low or high.

Two or more present:

Smooth Yellow Violet
Snakeroots
Lopseed
Cleavers
Bloodroot
Sweet Cicely
Rattlesnake Fern
Virginia Waterleaf
Blue Cohosh

Two or more present:

Sweet Cicely
Lopseed
Rattlesnake fern
Tick Trefoils
Snakeroots
Gray dogwood
Roses

Group on left poorly represented or any of the following present:

Sugar Maple
Basswood
White Ash

ATiFrCa(O)

3-185

ATiFrCa

3-185

Comparison of Major Floristic Differences Between Closely Related Habitat Types in Region 10

		<u>ATiFrVb(Cr)</u>	<u>ATiFrVb</u>
Cornus racemosa	Gray dogwood	89	56
Rhamnus cathartica	Common buckthorn	75	39
Viburnum lentago	Nannyberry	62	39
Corylus cornuta	Beaked hazelnut	34	4
Acer saccharum	Sugar maple	6	87
Tilia americana	Basswood	20	66
Trillium cernuum	Nodding trillium	6	56
Viburnum acerifolium	Maple-leaved viburnum	20	43
Actaea spp.	Baneberries	6	31
Thalictrum dioicum	Early meadow rue	13	31

		<u>ATiFrVb(Cr)</u>	<u>ATiFrCa</u>
Cornus racemosa	Gray dogwood	89,10	10,1
Parthenocissus quinq.	Virginia creeper	89	68
Rhamnus cathartica	Common buckthorn	75	34
Viburnum raf.	Downy arrowwood	55	10
Amelanchier spp.	Juneberry	37,8	2,1
Acer saccharum	Sugar maple	6,2	81,13
Carya cordiformis	Bitternut hickory	17	63
Viola pensylvanica	Smooth yellow violet	6	60
Sanguinaria canadensis	Bloodroot	.	52
Smilax herbacea	Carrion flower	17	52
Caulophyllum thal.	Blue cohosh	.	50
Actaea spp.	Baneberries	6	44
Hydrophyllum virgin.	Virginia waterleaf	.	31

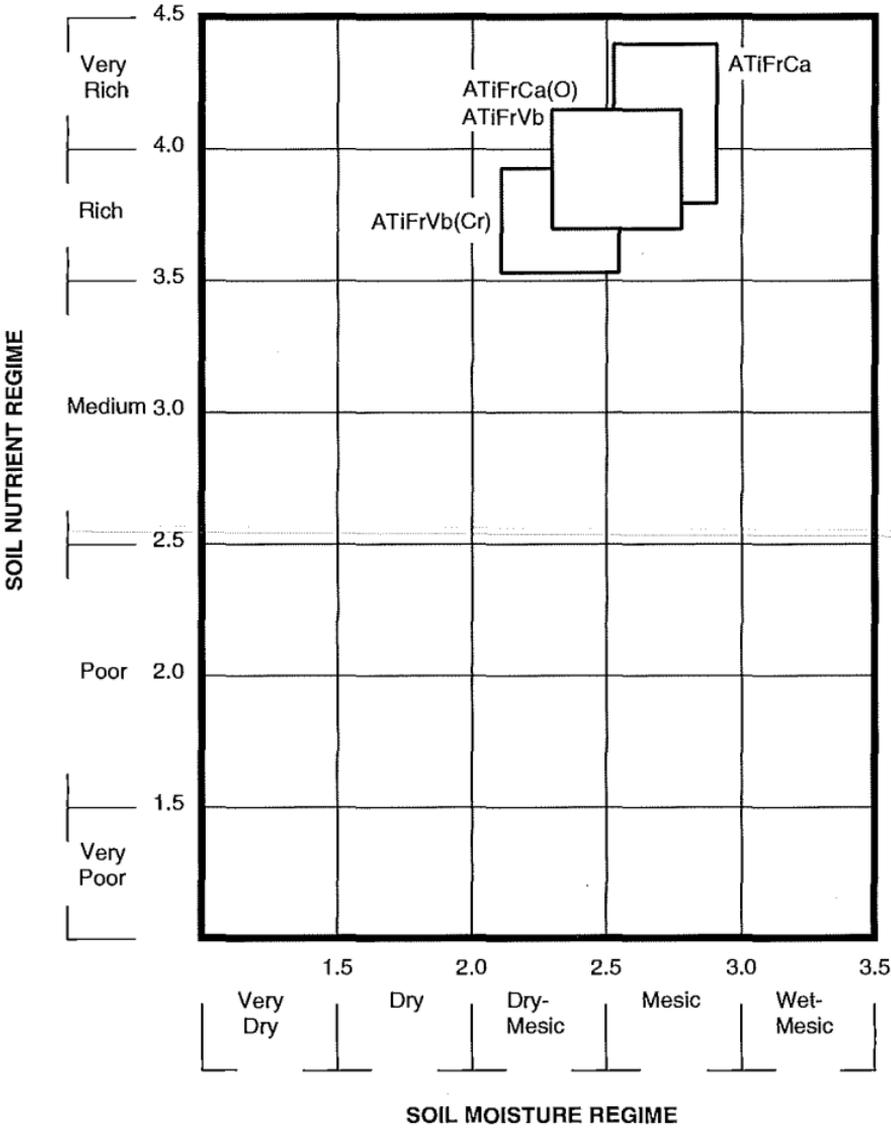
		<u>ATiFrVb</u>	<u>ATiFrCa</u>
Vitis riparia	Riverbank grape	83	36
Cornus racemosa	Gray dogwood	56	10
Viburnum raf.	Downy arrowwood	47	10
Viburnum acerifolium	Maple-leaved viburnum	43	5
Amelanchier spp.	Juneberry	39	2
Viola pensylvanica	Smooth yellow violet	10	60
Sanguinaria canadensis	Bloodroot	25	52
Caulophyllum thal.	Blue cohosh	27	50
Hydrophyllum virgin.	Virginia waterleaf	8	31

		<u>ATiFrVb(Cr)</u>	<u>ATiFrCa(O)</u>
<i>Fraxinus americana</i>	White ash	68,14	33,1
<i>Viburnum lentago</i>	Nannyberry	62,6	25,1
<i>Viburnum raf.</i>	Downy arrowwood	55	11
<i>Phryma leptostachya</i>	Lopseed	3	77
<i>Smilax herbacea</i>	Carrion flower	17	72
<i>Osmorhiza claytoni</i>	Sweet cicely	3	69
<i>Botrychium virginianum</i>	Rattlesnake fern	.	63
<i>Sanicula marilandica</i>	Black snakeroot	6,1	25,6
<i>Cryptotaenia can.</i>	Honewort	.	22

		<u>ATiFrVb</u>	<u>ATiFrCa(O)</u>
<i>Fraxinus americana</i>	White ash	93,8	33,1
<i>Acer saccharum</i>	Sugar maple	87	25
<i>Arisaema atrorubens</i>	Jack-in-the-pulpit	83	36
<i>Tilia americana</i>	Basswood	66	16
<i>Trillium cernuum</i>	Nodding trillium	56	8
<i>Cornus alternifolia</i>	Alternate-leaved dogwood	45	5
<i>Viburnum acerifolium</i>	Maple-leaved viburnum	43	2
<i>Thalictrum dioicum</i>	Early meadow rue	31	8
<i>Phryma leptostachya</i>	Lopseed	2	77
<i>Smilax herbacea</i>	Carrion flower	33	72
<i>Galium aparine</i>	Cleavers	2	69
<i>Osmorhiza claytoni</i>	Sweet cicely	2	69
<i>Desmodium glutinosum</i>	Pointed-leaved tick trefoil	18	66
<i>Botrychium virginianum</i>	Rattlesnake fern	2	63
<i>Amphicarpa bracteata</i>	Hog peanut	14	47
<i>Sanicula marilandica</i>	Black snakeroot	2,1	25,6

		<u>ATiFrCa</u>	<u>ATiFrCa(O)</u>
<i>Arisaema atrorubens</i>	Jack-in-the-pulpit	94,9	36,1
<i>Acer saccharum</i>	Sugar maple	81	25
<i>Tilia americana</i>	Basswood	76	16
<i>Fraxinus americana</i>	White ash	65	33
<i>Trillium cernuum</i>	Nodding trillium	60	8
<i>Sanguinaria canadensis</i>	Bloodroot	52	5
<i>Caulophyllum thal.</i>	Blue cohosh	50	16
<i>Thalictrum dioicum</i>	Early meadow rue	42	8
<i>Hydrophyllum virgin.</i>	Virginia waterleaf	31	5
<i>Parthenocissus quinq.</i>	Virginia creeper	68,4	94,11
<i>Rubus spp.</i>	Blackberries/raspberries	34	80
<i>Phryma leptostachya</i>	Lopseed	28	77
<i>Vitis riparia</i>	Riverbank grape	36	75
<i>Osmorhiza claytoni</i>	Sweet cicely	26	69
<i>Desmodium glutinosum</i>	Pointed-leaved tick trefoil	18	66
<i>Botrychium virginianum</i>	Rattlesnake fern	10	63
<i>Rhamnus cathartica</i>	Common buckthorn	34,3	61,13
<i>Xanthoxylum amer.</i>	Prickly ash	18	50
<i>Smilacina stellata</i>	Star-flwr'd solomon's seal	21	44

Relationship of Habitat Types to Soil Moisture and Nutrient Regimes in Region 10



ATiFrVb and ATiFrVb(Cr)
Acer saccharum-Tilia-Fraxinus/Viburnum sp.
(Sugar maple-Basswood-white ash/Viburnum)
and
***Cornus racemosa* (Gray dogwood) Phase**

Distribution:

ATiFrVb is most extensive in Washington and Waukesha counties, and in western parts of Dodge and Fond du Lac counties (Natural Division 5b). The ***Cornus* (Cr) phase** can be found in the same area, but is more prevalent west and south of the area described above. It is strongly associated with Natural Subdivision 5c.

Similar types: AFrDe (Region 11), **ATiCr(O)** (region 8).

Landform and soils:

Both the type proper and the phase occur on a variety of landform and soil combinations. Loams and silt loams over brown calcareous till, with rolling topography predominate. If soil is silt loam the subsoil is usually gravely, sandy or rocky. The combined effect of soil and landform creates **dry-mesic** conditions, but soils are **nutrient-rich**. Although our study did not examine landscape in terms of susceptibility to fire the vegetation of the ***Cornus* phase** reflects greater degree of fire disturbance than does the **ATiFrVb** type.

Vegetation:

Common forest cover types: The most characteristic feature of the **ATiFrVb** type is the presence of shade tolerant mesic hardwoods (*sugar maple, basswood or white ash*) even though *red* or *white oak* are often dominate the largest diameter classes. Stands of the ***Cornus* phase** are generally dominated by *white* or *red oak*, but *black cherry, American or slippery elm* and *shagbark hickory* are frequently present. Mesic hardwoods are absent except for sporadic occurrence of *white ash* seedlings or saplings.

Shrub and small tree layer: Stands of the **ATiFrVb** type have relatively moderate shrub layer. *Choke cherry* is usually most abundant. Other species with medium constancy levels are *black cherry, elm, gooseberries, arrowwood, maple-leaf viburnum* and *prickly ash*. On the other hand, the characteristic feature of the ***Cornus* phase** is a dense shrub layer. *Gray dogwood* (*Cornus racemosa*) has the highest constancy and strong representation. *Common buckthorn*, however, often dominates this layer.

Other important species are: *Nannyberry*, *choke cherry*, *black cherry* and *wild currants* and *gooseberries*.

Ground flora characteristics:

The following species represent the highest constancies and coverage in both types: *Virginia creeper*, *wild geranium*, *enchanter's nightshade* and *riverbank grape*. Several species that are well represented on dry-mesic sites in most southern regions are conspicuously absent or rare on this type. They include: *sweet cicely*, *lopseed*, *tick trefoil* and *black snakeroot*. In contrast with tree and shrub species only a handful of herbaceous species have been observed that occur preferentially on one or the other type, but the all have relatively low constancy values to be of practical value for field identification.

Disturbance and succession:

The **ATiFrVb** association and the **Cornus phase** appear to repre-

sent a site type with same or very similar biological potential i.e. dry-mesic nutrient rich conditions. However, the **Cornus** phase may be representing landscape positions that were historically more fire prone than those characterized by the **ATiFrVb** plant association. Presettlement records of vegetation show that the **Cornus** phase sites were occupied by *oak* forests or *oak* openings. We presume that current *mixed oak* stands on these sites would succeed to *white ash*, *basswood* and *sugar maple* if seed source were available. Most stands, however, do not currently contain appreciable seed source of these mesic species. The species most frequently present, and successfully regenerating are *black cherry*, *slippery elm* and *shagbark hickory*. If any of the mesic species is present usually it is usually *white ash*.

ATiFrVb(Cr)

Understory species in order of decreasing constancy, with average coverage.

Scientific name	Common name	Constancy Coverage	
		%	%
Herbs			
<i>Smilacina racemosa</i>	False solomon's seal	93	3.83
<i>Parthenocissus quinquefolia</i>	Virginia creeper	89	15.44
<i>Vitis riparia</i>	Riverbank grape	89	1.56
<i>Circaea quadrisulcata</i>	Enchanter's nightshade	86	2.69
<i>Geranium maculatum</i>	Wild geranium	82	4.46
<i>Arisaema atrorubens</i>	Jack-in-the-pulpit	58	1.92
<i>Geum canadense</i>	White avens	58	0.30
Grasses spp.	Grasses	51	1.14
<i>Rhus radicans</i>	Poison ivy	44	2.92
<i>Podophyllum peltatum</i>	Mayapple	34	4.62
<i>Desmodium glutinosum</i>	Pointed-leaved tick trefoil	31	0.27
<i>Alliaria officinalis</i>	Garlic mustard	31	2.24
<i>Smilacina stellata</i>	Star-flowered solomon's seal	31	0.53
<i>Agrimonia gryposepala</i>	Agrimony	27	0.16
<i>Anemone quinquefolia</i>	Wood anemone	27	0.22
<i>Ranunculus abortivus</i>	Small-flowered crowfoot	24	0.17
<i>Amphicarpa bracteata</i>	Hog peanut	20	0.10
<i>Asclepias exaltata</i>	Poke milkweed	20	0.10
<i>Celestrus scandens</i>	Climbing bittersweet	20	0.18
<i>Potentilla simplex</i>	Common cinquefoil	20	0.10
Shrubs			
<i>Prunus virginiana</i>	Chokecherry	96	8.82
<i>Cornus racemosa</i>	Gray dogwood	89	9.44
<i>Rhamnus cathartica</i>	Common buckthorn	75	22.87
<i>Viburnum lentago</i>	Nannyberry	62	5.82
<i>Ribes cynosbati</i>	Prickly gooseberry	58	8.44
<i>Viburnum rafinesquianum</i>	Downy arrowwood	55	1.98
<i>Rosa</i> spp.	Roses	55	0.28
<i>Rubus</i> spp.	Blackberries/raspberries	55	2.92
<i>Xanthoxylum americanum</i>	Prickly ash	37	5.14
<i>Amelanchier</i> spp.	Juneberry	37	8.36
<i>Corylus cornuta</i>	Beaked hazelnut	34	5.01
<i>Cornus alternifolia</i>	Alternate-leaved dogwood	24	9.77
<i>Lonicera canadensis</i>	American fly honeysuckle	20	6.20
<i>Viburnum acerifolium</i>	Maple-leaved viburnum	20	2.67
Tree Seedlings			
<i>Prunus serotina</i>	Black cherry	89	4.55
<i>Fraxinus americana</i>	White ash	68	13.52
<i>Carya ovata</i>	Shagbark hickory	62	0.51
<i>Ulmus</i> spp.	Elms	51	0.75
<i>Quercus alba</i>	White oak	34	0.25
<i>Quercus rubra</i>	Northern red oak	34	0.20
<i>Acer negundo</i>	Box elder	31	0.32
<i>Acer rubrum</i>	Red maple	31	0.64
<i>Tilia americana</i>	Basswood	20	0.20

ATiFrVb

Understory species in order of decreasing constancy, with average coverage.

Scientific name	Common name	Constancy Coverage	
		%	%
Herbs			
<i>Circaea quadrisulcata</i>	Enchanter's nightshade	97	2.03
<i>Vitis riparia</i>	Riverbank grape	83	0.70
<i>Arisaema atrorubens</i>	Jack-in-the-pulpit	83	2.39
<i>Smilacina racemosa</i>	False solomon's seal	83	5.61
<i>Geum canadense</i>	White avens	64	0.23
<i>Geranium maculatum</i>	Wild geranium	64	6.68
<i>Parthenocissus quinquefolia</i>	Virginia creeper	62	9.08
<i>Trillium cernuum</i>	Nodding trillium	56	0.37
Grasses spp.	Grasses	54	0.92
<i>Podophyllum peltatum</i>	Mayapple	45	3.36
<i>Rhus radicans</i>	Poison ivy	37	0.59
<i>Ranunculus abortivus</i>	Small-flowered crowfoot	35	0.19
<i>Smilax herbacea</i>	Carrion flower	33	0.16
<i>Actaea</i> spp.	Baneberries	31	0.62
<i>Thalictrum dioicum</i>	Early meadow rue	31	3.19
<i>Caulophyllum thalictroides</i>	Blue cohosh	27	0.22
<i>Sanguinaria canadensis</i>	Bloodroot	25	0.14
<i>Potentilla simplex</i>	Common cinquefoil	22	1.76
<i>Polygonatum pubescens</i>	Hairy solomon's seal	22	0.28
<i>Alliaria officinalis</i>	Garlic mustard	20	2.85
Shrubs			
<i>Prunus virginiana</i>	Chokecherry	97	12.00
<i>Ribes cynosbati</i>	Prickly gooseberry	77	5.23
<i>Cornus racemosa</i>	Gray dogwood	56	3.08
<i>Viburnum rafinesquianum</i>	Downy arrowwood	47	2.89
<i>Xanthoxylum americanum</i>	Prickly ash	47	6.83
<i>Rubus</i> spp.	Blackberries/raspberries	47	0.40
<i>Cornus alternifolia</i>	Alternate-leaved dogwood	45	3.41
<i>Viburnum acerifolium</i>	Maple-leaved viburnum	43	2.90
<i>Viburnum lentago</i>	Nannyberry	39	0.64
<i>Amelanchier</i> spp.	Juneberry	39	3.52
<i>Rhamnus cathartica</i>	Common buckthorn	39	1.45
<i>Lonicera canadensis</i>	American fly honeysuckle	35	0.70
<i>Rosa</i> spp.	Roses	22	0.15
<i>Viburnum trilobum</i>	Highbush cranberry	20	2.56
Tree Seedlings			
<i>Fraxinus americana</i>	White ash	93	8.44
<i>Prunus serotina</i>	Black cherry	93	4.08
<i>Acer saccharum</i>	Sugar maple	87	14.59
<i>Ulmus</i> spp.	Elms	83	0.81
<i>Tilia americana</i>	Basswood	66	1.66
<i>Carya ovata</i>	Shagbark hickory	60	0.99
<i>Quercus rubra</i>	Northern red oak	54	0.50
<i>Carya cordiformis</i>	Bitternut hickory	47	0.50
<i>Ostrya virginiana</i>	Ironwood	37	0.62
<i>Acer rubrum</i>	Red maple	31	0.24

ATiFrCa and ATiFrCa(O)
Acer saccharum-Tilia-Fraxinus/Caulophyllum
(Sugar maple-Basswood-White ash/Blue cohosh)
and
***Osmorhiza* (Sweet cicely) Phase**

Distribution:

The **ATiFrCa** type is best represented in Fon du Lac and eastern parts of Dodge, Jefferson and Waukesha counties. (Natural Subdivision 5b). Also scattered in Green and Rock Counties (Natural Subdivision 5d). The **Osmorhiza** phase is found primarily west of area described above, but can occur anywhere within region 10.

Similar types: ATiAs(De), ATiH (region 8).

Landform and soils:

Both the type proper and the phase occur on a variety of landform and soil combinations. Silt loams and loams over brown calcareous till, with rolling topography predominate. The combined effect of soil and landform creates **mesic, nutrient-rich** and **very rich** conditions. Although our study did not examine landscape in terms of susceptibility to fire the vegetation of the **Osmorhiza** phase reflects greater degree of fire disturbance than does the **ATiFrCa** type.

Vegetation:

Common forest cover types: Average stand composition on the **ATiFrCa** is similar to that on **ATiFrVb** and **ATiFrVb(Cr)** types. *Sugar maple, basswood* and *white ash*, with *red oak* in the largest size classes, share dominance in most stands. *Bitternut* and *shagbark hickory* are often present in small numbers. The **Osmorhiza** phase lacks mesic hardwoods. Stands are mixtures of *red oak, white oak, American* and *slippery elm, black cherry* and *shagbark hickory*.

Shrub and small tree layer: This layer is generally not well developed on the **ATiFrCa**. Only *choke cherry* is frequently well represented. *Wild currants* and *gooseberries* are present with relatively low abundance. The **Osmorhiza** phase, on the other hand, is often dominated by shrubs. In addition to species listed above *common buckthorn, blackberries, gray dogwood* and *prickly ash* are often well represented.

Ground flora characteristics:

Herb layer is well represented, both in number of species and coverage, unless the tree canopy or the sapling layer is exceptionally dense. The most common and well represented species are: *enchanter's nightshade*, *false solomon's seal*, *wild geranium*, *white avens*, *Virginia creeper* and *mayapple*. Species better represented on the **ATiFrCa** type are: *Jack-in-the-pulpit*, *trillium*, *blood-root*, *meadow rue*, *Virginia water-leaf* and *blue cohosh*. More frequently present, or more abundant, on the **Osmorhiza** phase are: *sweet cicely*, *Virginia creeper*, *riverbank grape*, *lopseed*, *tick trefoil* and *rattlesnake fern*. Because no species of high constancy occurs exclusively on any one habitat type it is often necessary to use a group of species with only moderate constancies but high preference as characterizing species for the type. However, for convenience only one species is used in naming the type. Thus *blue cohosh* with a constancy value of only 50% on the **ATiFrCa** type was chosen for naming the type as a representative of an ecological species group with high preference for mesic sites. Virtual absence of

the *blue cohosh* ecological species group from the **Osmorhiza** phase is presumed to be related to fire history (see further discussion below).

Disturbance and succession:

The **ATiFrCa** association and the **Osmorhiza** phase appear to represent a site type with same or very similar biological potential i.e. mesic nutrient rich to very rich conditions. However, the **Osmorhiza** phase may be representing landscape positions that were historically more fire prone than those characterized by the **ATiFrCa** plant association. Pre-settlement records of vegetation show that the **Osmorhiza** phase sites were occupied by oak forests or oak openings. We presume that current mixed oak stands on these sites would succeed to *white ash*, *basswood* and *sugar maple* if seed source were available. Most stands, however, do not currently contain appreciable seed source of these mesic species. The species most frequently present, and successfully regenerating are *American* and *slippery elm*, *black cherry* and *shagbark hickory*. If any of the mesic species is present usually it is *white ash*.

ATiFrCa(O)

Understory species in order of decreasing constancy, with average coverage.

Scientific name	Common name	Constancy Coverage	
		%	%
Herbs			
<i>Circaea quadrisulcata</i>	Enchanter's nightshade	97	6.01
<i>Parthenocissus quinquefolia</i>	Virginia creeper	94	11.26
<i>Smilacina racemosa</i>	False solomon's seal	88	1.27
<i>Geum canadense</i>	White avens	83	1.17
<i>Phryma leptostachya</i>	Lopseed	77	0.65
<i>Vitis riparia</i>	Riverbank grape	75	0.89
<i>Geranium maculatum</i>	Wild geranium	75	7.71
<i>Smilax herbacea</i>	Carrion flower	72	0.48
<i>Osmorhiza claytoni</i>	Sweet cicely	69	2.02
<i>Galium aparine</i>	Cleavers	69	0.86
<i>Desmodium glutinosum</i>	Pointed-leaved tick trefoil	66	1.67
<i>Botrychium virginianum</i>	Rattlesnake fern	63	0.34
Grasses spp.	Grasses	61	1.97
<i>Anemone quinquefolia</i>	Wood anemone	58	0.50
<i>Ranunculus abortivus</i>	Small-flowered crowfoot	52	0.16
<i>Podophyllum peltatum</i>	Mayapple	50	6.77
<i>Rhus radicans</i>	Poison ivy	50	1.55
<i>Amphicarpa bracteata</i>	Hog peanut	47	0.62
<i>Smilacina stellata</i>	Star-flowered solomon's seal	44	0.47
<i>Viola pensylvanica</i>	Smooth yellow violet	38	0.73
<i>Arisaema atrorubens</i>	Jack-in-the-pulpit	36	1.18
<i>Agrimonia gryposepala</i>	Agrimony	33	0.22
<i>Viola pubescens</i>	Downy yellow violet	33	1.42
<i>Dioscorea villosa</i>	Wild yam root	33	0.22
<i>Dryopteris spinulosa</i>	Spinulose shield fern	25	1.23
<i>Sanicula marilandica</i>	Black snakeroot	25	6.08
<i>Uvularia grandiflora</i>	Large-flowered bellwort	25	0.86
<i>Cryptotaenia canadensis</i>	Honewort	22	2.03
<i>Galium triflorum</i>	Sweet-scented bedstraw	22	0.52
<i>Actaea</i> spp.	Baneberries	22	0.16
Shrubs			
<i>Prunus virginiana</i>	Chokecherry	97	4.82
<i>Ribes cynosbati</i>	Prickly gooseberry	91	11.32
<i>Rubus</i> spp.	Blackberries/raspberries	80	3.59
<i>Rhamnus cathartica</i>	Common buckthorn	61	12.65
<i>Cornus racemosa</i>	Gray dogwood	52	3.85
<i>Xanthoxylum americanum</i>	Prickly ash	50	10.96
<i>Rosa</i> spp.	Roses	44	0.59
<i>Viburnum lentago</i>	Nannyberry	25	0.53
<i>Sambucus canadensis</i>	Common elder	22	0.16
<i>Corylus americana</i>	Hazel-nut	22	4.01

continued...

...continued

Scientific name	Common name	Constancy Coverage	
		%	%
Tree Seedlings			
<i>Prunus serotina</i>	Black cherry	88	1.58
<i>Ulmus</i> spp	Elms	86	2.75
<i>Carya ovata</i>	Shagbark hickory	69	0.38
<i>Acer negundo</i>	Box elder	47	0.25
<i>Quercus alba</i>	White oak	44	0.34
<i>Quercus rubra</i>	Northern red oak	38	0.10
<i>Fraxinus americana</i>	White ash	33	0.63
<i>Carya cordiformis</i>	Bitternut hickory	33	1.27
<i>Acer saccharum</i>	Sugar maple	25	11.68

ATiFrCa

Understory species in order of decreasing constancy, with average coverage.

Scientific name	Common name	Constancy %	Coverage %
Herbs			
<i>Circaea quadrisulcata</i>	Enchanter's nightshade	97	6.71
<i>Smilacina racemosa</i>	False solomon's seal	94	4.18
<i>Arisaema atrorubens</i>	Jack-in-the-pulpit	94	5.08
<i>Geranium maculatum</i>	Wild geranium	81	10.26
<i>Geum canadense</i>	White avens	78	0.74
<i>Parthenocissus quinquefolia</i>	Virginia creeper	68	4.18
Grasses spp.	Grasses	65	0.40
<i>Podophyllum peltatum</i>	Mayapple	63	4.70
<i>Viola pensylvanica</i>	Smooth yellow violet	60	1.91
<i>Trillium cernuum</i>	Nodding trillium	60	1.09
<i>Smilax herbacea</i>	Carrion flower	52	1.21
<i>Sanguinaria canadensis</i>	Bloodroot	52	0.63
<i>Caulophyllum thalictroides</i>	Blue cohosh	50	1.05
<i>Actaea</i> spp.	Baneberries	44	0.13
<i>Thalictrum dioicum</i>	Early meadow rue	42	5.70
<i>Vitis riparia</i>	Riverbank grape	36	0.34
<i>Amphicarpa bracteata</i>	Hog peanut	36	0.83
<i>Ranunculus abortivus</i>	Small-flowered crowfoot	31	0.22
<i>Hydrophyllum virginianum</i>	Virginia waterleaf	31	2.28
<i>Anemone quinquefolia</i>	Wood anemone	28	0.15
<i>Phryma leptostachya</i>	Lopseed	28	0.59
<i>Dryopteris spinulosa</i>	Spinulose shield fern	28	2.12
<i>Osmorhiza claytoni</i>	Sweet cicely	26	0.54
<i>Allium tricoccum</i>	Wild leek	23	0.27
<i>Rhus radicans</i>	Poison ivy	21	4.19
<i>Alliaria officinalis</i>	Garlic mustard	21	17.10
<i>Smilacina stellata</i>	Star-flowered solomon's seal	21	0.22
Shrubs			
<i>Prunus virginiana</i>	Chokecherry	89	10.60
<i>Ribes cynosbati</i>	Prickly gooseberry	73	3.73
<i>Rhamnus cathartica</i>	Common buckthorn	34	3.24
<i>Rubus</i> spp.	Blackberries/raspberries	34	0.36
<i>Cornus alternifolia</i>	Alternate-leaved dogwood	23	4.06
<i>Sambucus pubens</i>	Red-berried elder	21	0.16
<i>Viburnum lentago</i>	Nannyberry	21	0.16
Tree Seedlings			
<i>Acer saccharum</i>	Sugar maple	81	13.18
<i>Ulmus</i> spp.	Elms	78	3.04
<i>Tilia americana</i>	Basswood	76	0.64
<i>Fraxinus americana</i>	White ash	65	5.36
<i>Carya cordiformis</i>	Bitternut hickory	63	1.48
<i>Prunus serotina</i>	Black cherry	63	0.79
<i>Carya ovata</i>	Shagbark hickory	47	0.88
<i>Quercus rubra</i>	Northern red oak	36	0.21
<i>Acer negundo</i>	Box elder	31	0.47
<i>Ostrya virginiana</i>	Ironwood	21	0.29

Occurrence of Tree Species on Habitat Types of Region 10

Size classes: SE - seedlings; SA - saplings; MT - medium trees (4-10" DBH); LT - large trees (>10" DBH). Numbers are frequency of occurrence: * <10%; 1, 10-25%; 2, 26-50%; 3, 51-75%; 4, 76-100%. Letters are coverage classes: A <5%; B 5-15%; C 16-35%; D >35%.

	ATIFrVb(Cr)				ATIFrVb				ATIFrCa(O)				ATIFrCa			
	SE	SA	MT	LT	SE	SA	MT	LT	SE	SA	MT	LT	SE	SA	MT	LT
Jack pine																
Bur oak		*	*	*					*		*	1 C	*			*
Northern pin oak				*								*				
Trembling aspen	*		*						*							
Bigtooth aspen	*	*	*	*	1 A	*	*	*			*				*	*
Red pine																
Black oak	*		1 A	1 C					*	*	*	1 D			*	
Black walnut	*	*		*	*	*			*	*	*	*	*	*	*	*
Paper birch					*	*	*									
Black ash	*	*			*	*			*	*	*	*	*	*	*	*
Northern red oak	*	1 A	2 B	2 D	1 A	*	1 B	3 D	1 A	1 B	1 B	2 C	1 A		1 B	3 C
White pine											*	*				
White oak	* A	1 B	3 B	4 D			1 B	3 D	1 A	*	1 B	3 D			*	1 C
Butternut		*							*	*	*	*				
Swamp white oak	*	*	*	*					*	*	*	*	*	*	*	*
Shagbark hickory	2 A	3 B	2 C	2 C	2 A	1 A	1 B	1 C	3 A	2 A	2 B	1 C	2 A	1 A	1 C	1 C
Black cherry	3 B	4 B	3 B	1 B	4 A	3 B	2 B	*	3 A	3 B	2 C	1 C	2 A	1 A	1 B	1 B
Box elder	2 A	2 A	*		1 A	*	*		2 A	2 B	*		2 A	1 B	*	*
Hackberry									*	*	*	*	*	*	*	*
Elms	2 A	3 C	2 B	1 C	3 A	3 C	2 B	*	3 A	3 D	3 C	2 C	3 A	3 C	3 B	2 B
American elm																
White ash	3 B	3 C	2 B	1 B	4 B	3 B	2 B	1 B	1 A	1 B	1 C	1 B	3 B	2 B	2 B	2 C
Green ash				*	*			*	*	*			*	*	*	*
Yellow birch																
Bitternut hickory	1 A	1 C	*		2 A	1 A	*		2 A	2 C	1 C	*	2 A	2 B	1 B	*
Red maple	1 A	2 C	1 C	1 B	1 A	2 B	1 B	*		*	*	*	*	*	*	*
American hornbeam	*	*	*		*	*	*		*	*	*		*	*	*	*
Ironwood	*	1 B	*		2 A	3 C	1 C		*	1 C	*		1 A	1 A	2 B	*
Basswood	1 A	1 B	1 C	*	3 A	2 B	2 B	2 C	1 A	2 B	1 C	*	3 A	2 B	2 C	2 C
Eastern hemlock																
American beech					*	*	*	*					*	*		
Sugar maple	*	1 C	*	*	4 B	4 C	3 D	3 D	1 C	1 C	*	*	3 B	3 D	3 C	2 D

Understory Species with Potential Diagnostic Value for Distinguishing Among the Habitat Types in Region 10

Number represent frequency of occurrence classes: * 10-25%; 1, 26-50%; 2, 51-75%; 3, 76-100%. Letters are coverage classes: A<5%; B 6-15%; C>15%.

Scientific Name	Common Name	ATIFrVb(Cr)		ATIFrCa(O)	
			ATIFrVb		ATIFrCa
Herbs					
<i>Apocynum androsaemifolium</i>	Spreading dogbane	*			
<i>Ranunculus recurvatus</i>	Hooked crowfoot		*		
<i>Hepatica americana</i>	Round-lobed hepatica	*	*		
<i>Triosteum aurantiacum</i>	Orange-fruited horse gentain	*	*		
<i>Agrimonia gryposepala</i>	Agrimony	1 A		1 A	
<i>Alliaria officinalis</i>	Garlic mustard	1 A	*	*	*
<i>Smilacina stellata</i>	Star-flowered solomon's seal	1 A	*	1 A	*
<i>Rhus radicans</i>	Poison ivy	1 A	1 A	1 A	*
<i>Circaea quadrisulcata</i>	Enchanter's nightshade	3 A	3 A	3 B	3 B
<i>Parthenocissus quinquefolia</i>	Virginia creeper	3 C	2 B	3 B	2 A
<i>Geranium maculatum</i>	Wild geranium	3 A	2 B	2 B	3 B
<i>Smilacina racemosa</i>	False solomon's seal	3 A	3 B	3 A	3 A
<i>Vitis riparia</i>	Riverbank grape	3 A	3 A	2 A	1 A
<i>Arisaema atrorubens</i>	Jack-in-the-pulpit	2 A	3 A	1 A	3 B
<i>Geum canadense</i>	White avens	2 A	2 A	3 A	3 A
<i>Podophyllum peltatum</i>	Mayapple	1 A	1 A	1 B	2 A
<i>Desmodium glutinosum</i>	Pointed-leaved tick trefoil	1 A	*	2 A	*
<i>Anemone quinquefolia</i>	Wood anemone	1 A	*	2 A	1 A
<i>Amphicarpa bracteata</i>	Hog peanut	*	*	1 A	1 A
<i>Smilax herbacea</i>	Carriion flower	*	1 A	2 A	2 A
<i>Ranunculus abortivus</i>	Small-flowered crowfoot	*	1 A	2 A	1 A
<i>Dioscorea villosa</i>	Wild yam root	*	*	1 A	*
<i>Actaea spp.</i>	Baneberries		1 A	*	1 A
<i>Viola pensylvanica</i>	Smooth yellow violet		*	1 A	2 A
<i>Viola pubescens</i>	Downy yellow violet		*	1 A	*
<i>Allium tricoccum</i>	Wild leek		*	*	*
<i>Caulophyllum thalictroides</i>	Blue cohosh		1 A	*	1 A
<i>Polygonatum pubescens</i>	Hairy solomon's seal		*	*	*
<i>Osmorhiza claytoni</i>	Sweet cicely			2 A	1 A
<i>Sanicula gregaria</i>	Clustered snakeroot			*	*
<i>Galium aparine</i>	Cleavers			2 A	*
<i>Uvularia grandiflora</i>	Large-flowered bellwort			*	*
<i>Cryptotaenia canadensis</i>	Honewort			*	*
<i>Phryma leptostachya</i>	Lopseed			3 A	1 A
<i>Botrychium virginianum</i>	Rattlesnake fern			2 A	*
<i>Thalictrum dioicum</i>	Early meadow rue	*	1 A		1 B
<i>Dryopteris spinulosa</i>	Spinulose shield fern	*		*	1 A
<i>Sanguinaria canadensis</i>	Bloodroot		*		2 A

continued...

Scientific Name	Common Name	ATIFrVb(Cr)		ATIFrCa(O)	
			ATIFrVb		ATIFrCa
<i>Trillium cernuum</i>	Nodding trillium		2 A		2 A
<i>Smilax tamnoides</i>	Bristly greenbrier		*		*
<i>Sanicula marilandica</i>	Black snakeroot			*	
<i>Adiantum pedatum</i>	Maidenhair fern			*	
<i>Hydrophyllum virginianum</i>	Virginia waterleaf				1 A
<i>Hepatica acutiloba</i>	Sharp-lobed hepatica				*
Shrubs					
<i>Amelanchier</i> spp.	Juneberry	1 B	1 A		
<i>Viburnum acerifolium</i>	Maple-leaved viburnum	*	1 A		
<i>Cornus alternifolia</i>	Alternate-leaved dogwood	*	1 A		*
<i>Viburnum trilobum</i>	Highbush cranberry	*	*		*
<i>Corylus americana</i>	Hazel-nut	*		*	
<i>Corylus cornuta</i>	Beaked hazelnut	1 B		*	*
<i>Rosa</i> spp.	Roses	2 A	*	1 A	*
<i>Lonicera canadensis</i>	American fly honeysuckle	*	1 A	*	*
<i>Viburnum rafinesquianum</i>	Downy arrowwood	2 A	1 A	*	*
<i>Viburnum lentago</i>	Nannyberry	2 B	1 A	*	*
<i>Xanthoxylum americanum</i>	Prickly ash	1 B	1 B	1 B	*
<i>Cornus racemosa</i>	Gray dogwood	3 B	2 A	2 A	*
<i>Prunus virginiana</i>	Chokecherry	3 B	3 B	3 A	3 B
<i>Rubus</i> spp.	Blackberries/raspberries	2 A	1 A	3 A	1 A
<i>Ribes cynosbati</i>	Prickly gooseberry	2 B	3 B	3 B	2 A
<i>Rhamnus cathartica</i>	Common buckthorn	2 C	1 A	2 B	1 A

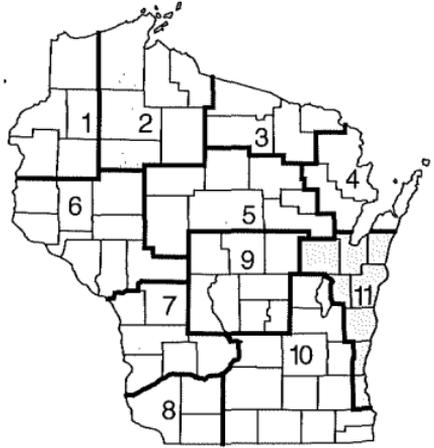
Region 11

Extent, topography, geology and soils

Region 11 encompasses Milwaukee, Ozaukee, Sheboygan, Calumet, Manitowoc, Outagamie, Brown and Kewaunee counties. The region is centered on Natural Division 3 (primarily subdivision 3c with small inclusions of subdivisions 3a and 3b). Natural division 3 is characterized primarily by level to rolling topography, reflecting the glacial Lake Michigan clay and silt deposits. The dominant soils are Kewaunee, (over till) and Oshkosh (over lacustrine silts and clays). Another important characteristic of natural division 3 is the presence of American beech, a species of eastern deciduous forests that reaches its western limits within this division.

The western edge of region 11 extends into natural subdivisions 5a and 5b. Most characteristic in this part of natural division 5 is a series of morainic ridges paralleling Lake Michigan, including the Kettle Moraine system. (For further description of natural division 5 see habitat type region 10).

It is important to note, that because of combination of lake-effect climate and predominance of fine-textured soils, mesic and dry-mesic, nutrient-rich sites prevail on the uplands of this region.



Many types of wetlands are also common, but dry sites occur only sporadically on local glacial out-washes, narrow, gravely eskers and occasional limestone out-crops with thin soils.

About 60 percent of this area is currently in cropland, 15 percent in pasture and 25 percent in wetland and forest.

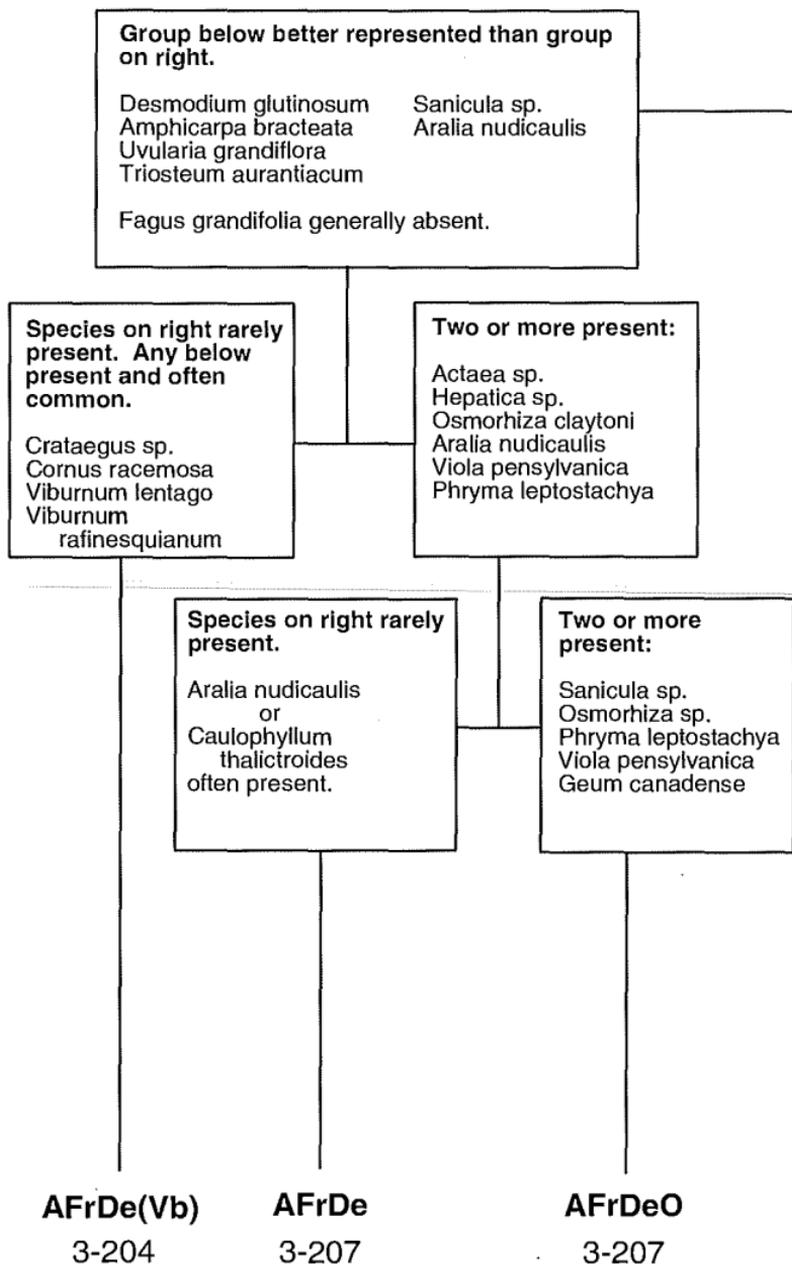
Forest vegetation

Most of this region was originally covered by northern mesic forest of sugar maple, beech, yellow birch, elm and some hemlock and white pine in northern parts and closer to Lake Michigan. Because the floristic tension zone in this part of the state runs almost directly north to south from near Green Bay to Milwaukee there is a conspicuous change in forest composition

toward the western margin of the region. Beech, hemlock and yellow birch disappear and white ash, basswood white oak and red oak become the principal associates of sugar maple, in forming southern mesic and dry mesic forests. Because wild fires in pre-settlement time were much less frequent in this region than they

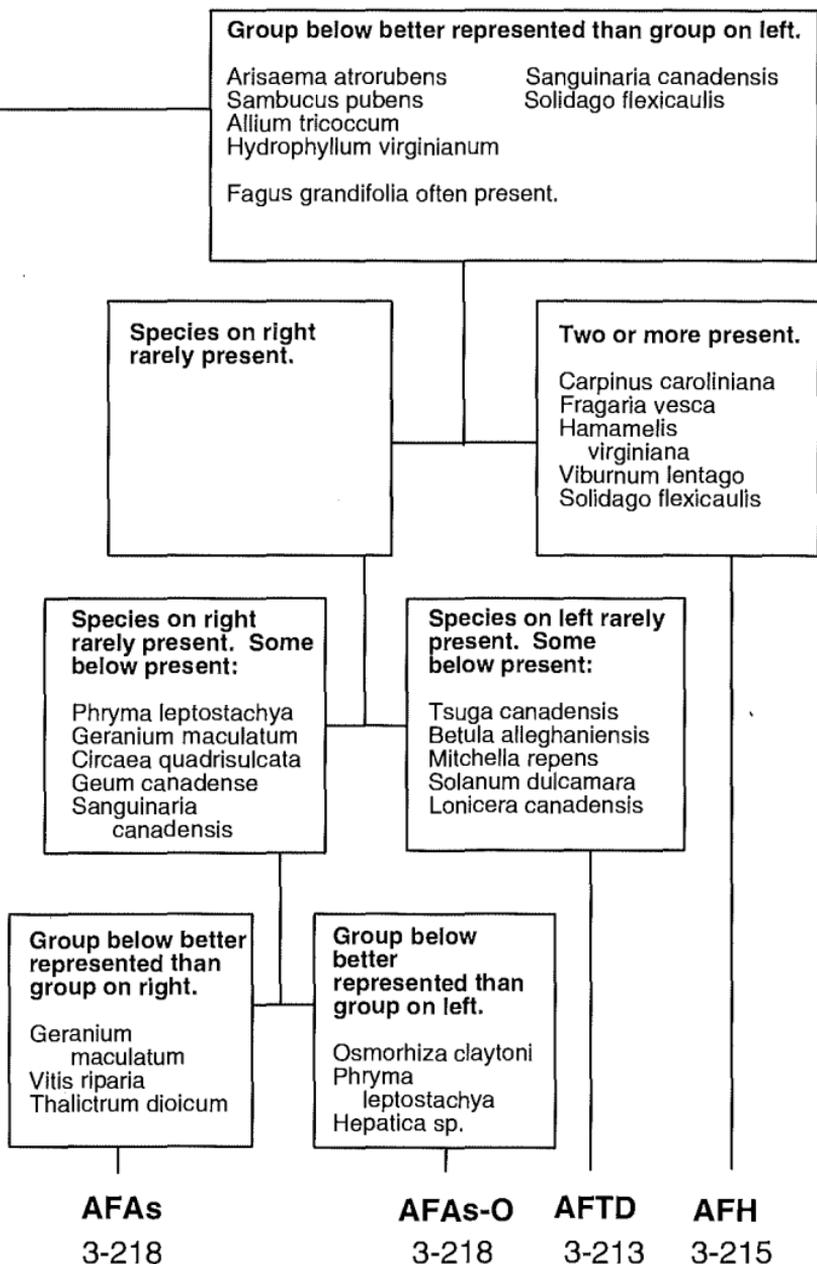
were in other parts of southern Wisconsin, oak forests without some presence of tolerant mesic hardwoods are not common. Therefore, regardless of current forest cover type, in the absence of management that favors less tolerant species, most stands are succeeding to sugar maple, ash, basswood or beech.

Key to Habitat Types of Region 11 - Scientific Names

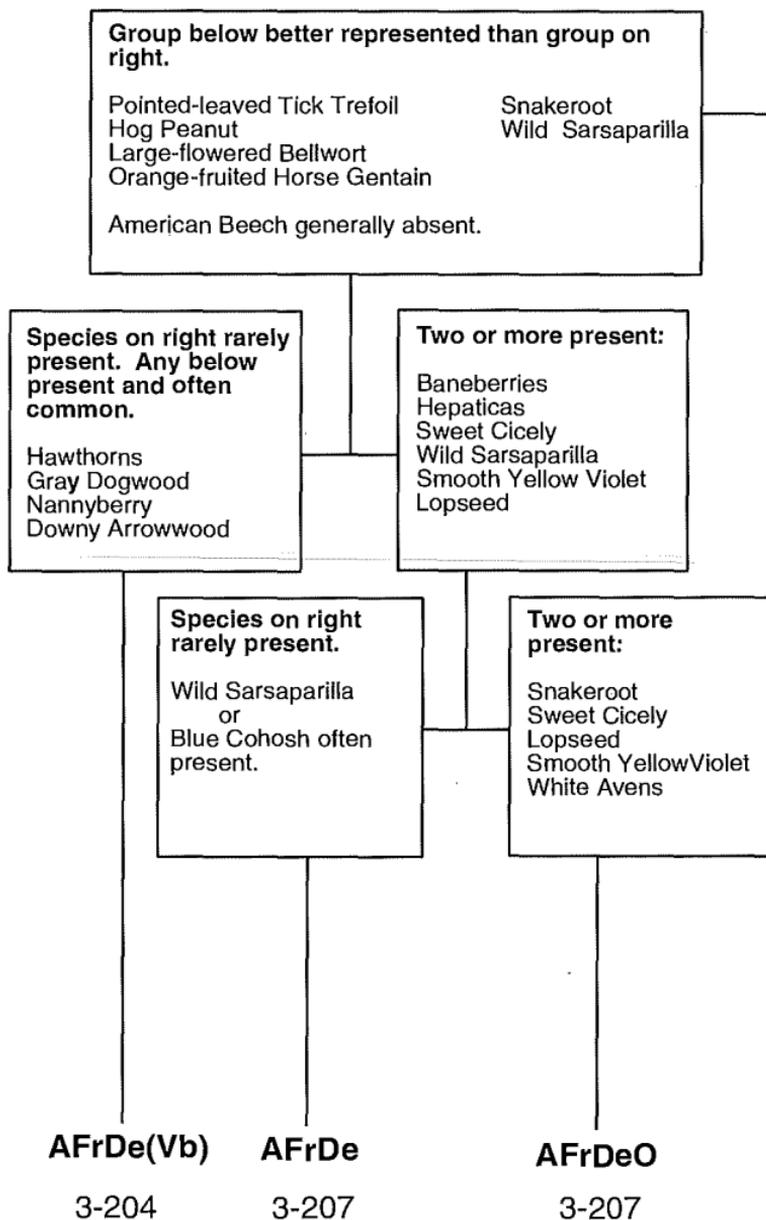


Group below well represented: Several species are found rather than any one being common.

Poorly represented: Usually no more than one species from the group present. Abundance may be low or high.

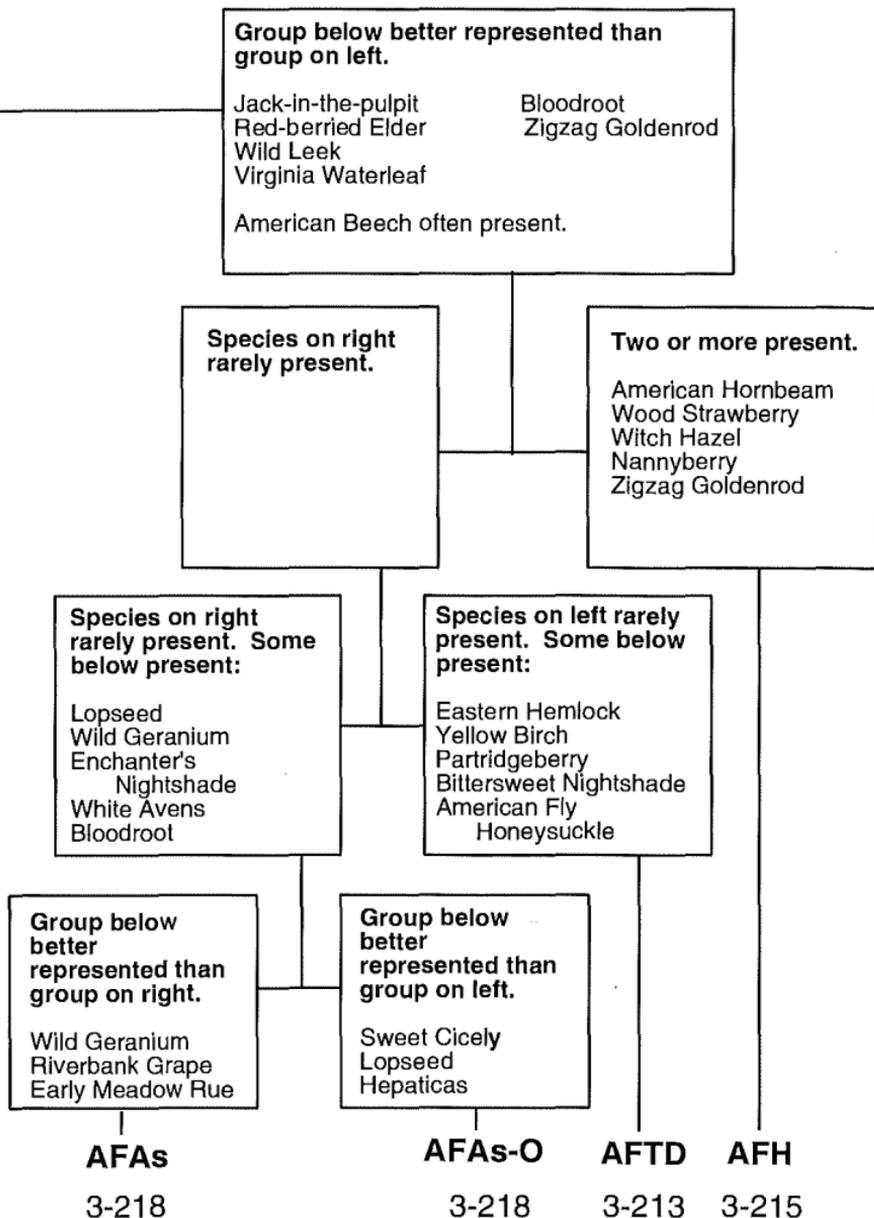


Key to Habitat Types of Region 11 - Common Names



Group below well represented: Several species are found rather than any one being common.

Poorly represented: Usually no more than one species from the group present. Abundance may be low or high.



Comparison of Major Floristic Differences Between Closely Related Habitat Types in Region 11

		AFrDe(Vb)	AFrDe
Viburnum acerifolium	Maple-leaved viburnum	100	70
Viburnum raf.	Downy arrowwood	85	52
Ulmus spp	Elms	78	29
Cornus racemosa	Gray dogwood	64	5
Rubus spp.	Blackberries/raspberries	64	29
Crataegus spp.	Hawthorns	57	.
Lonicera spp.	Honeysuckles	57	5
Viburnum lentago	Nannyberry	50	23
Parthenocissus quinq.	Virginia creeper	35	.
Aralia nudicaulis	Wild sarsaparilla	14	82
Actaea spp.	Baneberries	28	76
Caulophyllum thal.	Blue cohosh	.	70
Hepatica americana	Round-lobed hepatica	7	70
Botrychium virginianum	Rattlesnake fern	.	47
Podophyllum peltatum	Mayapple	7	47
Maianthemum canadense	Wild lily-of-the-valley	7	35
		AFrDeO	AFH
Uvularia grandiflora	Large-flowered bellwort	72	6
Amphicarpa bracteata	Hog peanut	72	26
Osmorhiza claytoni	Sweet cicely	65	20
Phryma leptostachya	Lopseed	58	.
Desmodium glutinosum	Pointed-leaved tick trefoil	51	.
Sanicula marilandica	Black snakeroot	44	6
Botrychium virginianum	Rattlesnake fern	41	.
Geranium maculatum	Wild geranium	58,1	93,8
Arisaema atrorubens	Jack-in-the-pulpit	24	80
Circaea quadrisulcata	Enchanter's nightshade	62,1	80,5
Viburnum lentago	Nannyberry	20	80
Fagus grandifolia	American beech	24	73
Hydrophyllum virgin.	Virginia waterleaf	.	73
Carpinus caroliniana	American hornbeam	10	66
Cornus racemosa	Gray dogwood	17	66
Dryopteris spinulosa	Spinulose shield fern	31	60
Fragaria vesca	Wood strawberry	13	60
Hamamelis virginiana	Witch hazel	20,8	60,14
Parthenocissus quinq.	Virginia creeper	20,1	53,7
Solidago flexicaulis	Zigzag goldenrod	.	53
Allium tricoccum	Wild leek	13	46
Caulophyllum thal.	Blue cohosh	17	46
Sanguinaria canadensis	Bloodroot	20	46
Solanum dulcamara	Bittersweet nightshade	3	33

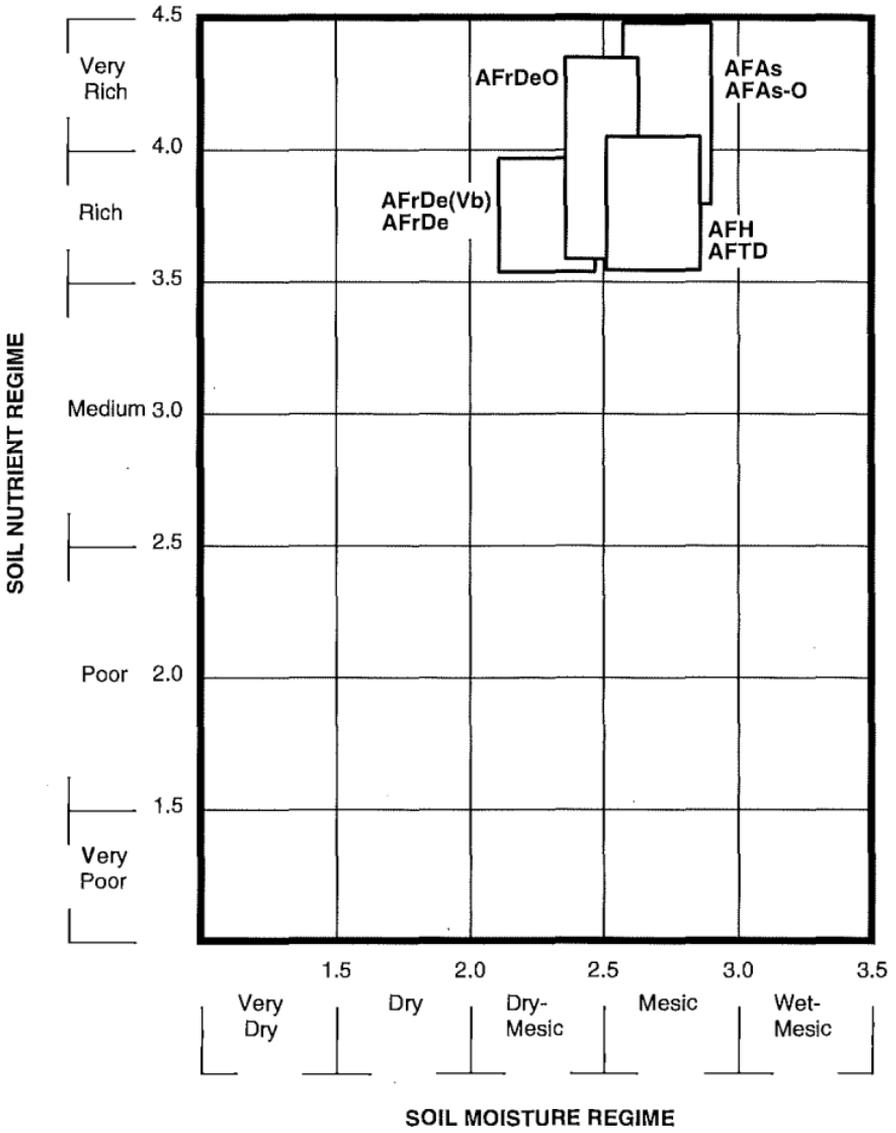
		AFA's	AFA's-O
<i>Circaea quadrifida</i>	Enchanter's nightshade	97	63
<i>Vitis riparia</i>	Riverbank grape	71	9
<i>Geranium maculatum</i>	Wild geranium	52	13
<i>Osmorhiza claytoni</i>	Sweet cicely	7	81
<i>Hepatica acutiloba</i>	Sharp-lobed hepatica	18	68
<i>Phryma leptostachya</i>	Lopseed	15	54
<i>Maianthemum canadense</i>	Wild lily-of-the-valley	18	45
<i>Aster macrophyllus</i>	Large-leaved aster	10,1	40,6
<i>Botrychium virginianum</i>	Rattlesnake fern	5	40
		AFA's-O	AFH
<i>Sambucus pubens</i>	Red-berried elder	86	20
<i>Osmorhiza claytoni</i>	Sweet cicely	81	20
<i>Phryma leptostachya</i>	Lopseed	54	.
<i>Botrychium virginianum</i>	Rattlesnake fern	40	.
<i>Uvularia grandiflora</i>	Large-flowered bellwort	36	6
<i>Geranium maculatum</i>	Wild geranium	13,1	93,8
<i>Crataegus</i> spp.	Hawthorns	.	92
<i>Viburnum lentago</i>	Nannyberry	4	80
<i>Arisaema atrorubens</i>	Jack-in-the-pulpit	36	80
<i>Hydrophyllum virgin.</i>	Virginia waterleaf	36	73
<i>Cornus racemosa</i>	Gray dogwood	4	66
<i>Fragaria vesca</i>	Wood strawberry	9	60
<i>Hamamelis virginiana</i>	Witch hazel	9,2	60,14
<i>Solidago flexicaulis</i>	Zigzag goldenrod	9	53
<i>Viburnum raf.</i>	Downy arrowwood	.	46
		AFrDe(Vb)	AFrDeO
<i>Geranium maculatum</i>	Wild geranium	92	58
<i>Viburnum raf.</i>	Downy arrowwood	85	31
<i>Cornus racemosa</i>	Gray dogwood	64	17
<i>Viburnum lentago</i>	Nannyberry	50	20
<i>Actaea</i> spp.	Baneberries	28	68
<i>Hepatica acutiloba</i>	Sharp-lobed hepatica	7	58
<i>Phryma leptostachya</i>	Lopseed	7	58
<i>Geum canadense</i>	White avens	21	51
<i>Botrychium virginianum</i>	Rattlesnake fern	.	41
<i>Arisaema atrorubens</i>	Jack-in-the-pulpit	.	24
		AFrDe	AFrDeO
<i>Aralia nudicaulis</i>	Wild sarsaparilla	82	20
<i>Caulophyllum thal.</i>	Blue cohosh	70	17
<i>Asclepias exaltata</i>	Poke milkweed	58	3
<i>Apocynum andro.</i>	Spreading dogbane	35	.
<i>Viola pensylvanica</i>	Smooth yellow violet	11	68
<i>Osmorhiza claytoni</i>	Sweet cicely	29	65
<i>Circaea quadrifida</i>	Enchanter's nightshade	29	62
<i>Phryma leptostachya</i>	Lopseed	23	58
<i>Geum canadense</i>	White avens	11	51
<i>Galium asprellum</i>	Cleavers	.	48

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		AFrDe	AFrDeO
Smilax tamnoides	Bristly greenbrier	17	48
Sanicula marilandica	Black snakeroot	17	44
		AFH	AFA s
Viburnum lentago	Nannyberry	80	26
Hydrophyllum virgin.	Virginia waterleaf	73	34
Maianthemum canadense	Wild lily-of-the-valley	66	18
Carpinus caroliniana	American hornbeam	66	7
Fragaria vesca	Wood strawberry	60	7
Hamamelis virginiana	Witch hazel	60,14	10,5
Aster macrophyllus	Large-leaved aster	60	10
Viburnum acerifolium	Maple-leaved viburnum	53	28
Solidago flexicaulis	Zigzag goldenrod	53	13
Viburnum raf.	Downy arrowwood	46	7
Hepatica acutiloba	Sharp-lobed hepatica	40	18
		AFA s-O	AFTD
Hepatica acutiloba	Sharp-lobed hepatica	68	8
Circaea quadrisulcata	Enchanter's nightshade	63	25
Sanguinaria canadensis	Bloodroot	54	.
Phryma leptostachya	Lopseed	54	16
Geum canadense	White avens	45	8
Botrychium virginianum	Rattlesnake fern	40	16
Hydrophyllum virgin.	Virginia waterleaf	36	8
Maianthemum canadense	Wild lily-of-the-valley	45	100
Dryopteris spinulosa	Spinulose shield fern	36	91
Solanum dulcamara	Bittersweet nightshade	4	50
Lonicera canadensis	American fly honeysuckle	9	41

Relationship of Habitat Types to Soil Moisture and Nutrient Regimes in Region 11



AFrDe(Vb)

Acer saccharum-Fraxinus/Desmodium habitat type, (*Viburnum* phase) (Sugar maple-White ash/Tick-trefoil [Maple-leaf viburnum phase])

Distribution:

Predominantly in western Sheboygan county but also western Manitowoc and Washington counties. Entirely Natural Subdivision 5b.

Similar types: AFrDe, AFrDeO (Region 11), ATiFrVb (Region 10).

Landform and soils:

Silt loams and loams over brown calcareous till. Rolling to steep kettle moraine topography common. Closely associated with the two AFrDe variants. **Dry-mesic/nutrient rich sites.**

Vegetation:

Common forest cover types: The *Viburnum* phase of AFrDe habitat type is usually dominated by various mixtures of *red oak*, *white oak*, *red maple* and *big-tooth aspen*. When *sugar maple* and *white ash* are present they are typically in the smaller size classes. *Basswood* is uncommon.

Shrub and small tree layer: The *Viburnum* phase generally has the most vigorous shrub layer of any type in this region. The following species are frequently represented with high coverage: *choke cherry*, *black cherry*,

maple-leaf viburnum, *arrowwood*, *wild currants* and *gooseberries*, *gray dogwood*, *blackberries* and *raspberries*. On the other hand, there is a conspicuous lack of *buckthorn* and *Japanese honeysuckle*.

Ground flora characteristics: In contrast to shrub and small tree layer herbaceous species are not well represented. Those with highest constancies are: *riverbank grape*, *wild geranium*, *meadow rue*, *trillium* and *big-leaf aster*. Sometimes *tick-trefoil* and *hog peanut* are well represented.

Disturbance and succession: The *Viburnum* phase is interpreted to be a disturbance phase of the AFrDe habitat type. Both, the tree layer and understory vegetation clearly indicate past disturbance. According to maps of presettlement vegetation some stands are developing in place of former oak savanna or oak openings, but others are logged-over maple-ash-basswood forests. *White ash* regeneration is observed in many stands where *sugar maple* is lacking. It appears that in the absence of disturbance ash dominated communities will precede *sugar maple-basswood* forests in many places.

AFrDe(Vb)

Understory species in order of decreasing constancy, with average coverage.

Scientific name	Common name	Constancy Coverage	
		%	%
Herbs			
<i>Vitis riparia</i>	Riverbank grape	100	2.31
<i>Geranium maculatum</i>	Wild geranium	92	2.62
<i>Trillium cernuum</i>	Nodding trillium	92	0.41
Grasses spp.	Grasses	85	10.91
<i>Triosteum aurantiacum</i>	Orange-fruited horse gentain	71	0.10
<i>Thalictrum dioicum</i>	Early meadow rue	71	4.63
<i>Aster macrophyllus</i>	Large-leaved aster	64	5.77
<i>Polygonatum pubescens</i>	Hairy solomon's seal	64	0.59
<i>Smilax herbacea</i>	Carrion flower	64	0.10
<i>Smilacina racemosa</i>	False solomon's seal	57	0.29
<i>Amphicarpa bracteata</i>	Hog peanut	57	4.14
<i>Desmodium glutinosum</i>	Pointed-leaved tick trefoil	57	8.81
<i>Uvularia grandiflora</i>	Large-flowered bellwort	42	0.18
<i>Prenanthes alba</i>	White lettuce	42	0.10
<i>Parthenocissus quinquefolia</i>	Virginia creeper	35	3.18
<i>Circaea quadrisulcata</i>	Enchanter's nightshade	35	0.10
<i>Dryopteris spinulosa</i>	Spinulose shield fern	35	0.30
<i>Ranunculus abortivus</i>	Small-flowered crowfoot	35	0.10
<i>Osmorhiza claytoni</i>	Sweet cicely	28	0.95
<i>Actaea</i> spp.	Baneberries	28	0.22
<i>Agrimonia gryposepala</i>	Agrimony	28	0.10
<i>Rhus radicans</i>	Poison ivy	28	0.22
<i>Conopholis americana</i>	Squawroot	28	0.10
<i>Galium asprellum</i>	Cleavers	21	0.27
<i>Geum canadense</i>	White avens	21	0.10
<i>Smilax tamnoides</i>	Bristly greenbrier	21	0.27
<i>Celestrus scandens</i>	Climbing bittersweet	21	0.10
Shrubs			
<i>Prunus virginiana</i>	Chokecherry	100	9.37
<i>Viburnum acerifolium</i>	Maple-leaved viburnum	100	3.96
<i>Ribes cynosbati</i>	Prickly gooseberry	92	4.29
<i>Viburnum rafinesquianum</i>	Downy arrowwood	85	2.88
<i>Amelanchier</i> spp.	Juneberry	85	2.19
<i>Cornus racemosa</i>	Gray dogwood	64	1.23
<i>Rubus</i> spp.	Blackberries/raspberries	64	2.40
<i>Crataegus</i> spp.	Hawthorns	57	0.95
<i>Lonicera</i> spp.	Honeysuckles	57	1.31
<i>Cornus alternifolia</i>	Alternate-leaved dogwood	57	0.95
<i>Viburnum lentago</i>	Nannyberry	50	2.79
<i>Hamamelis virginiana</i>	Witch hazel	21	17.53
<i>Rosa</i> spp.	Roses	21	0.27

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Scientific name	Common name	Constancy Coverage	
		%	%
Tree Seedlings			
<i>Fraxinus americana</i>	White ash	100	10.20
<i>Prunus serotina</i>	Black cherry	100	4.47
<i>Ostrya virginiana</i>	Ironwood	92	2.66
<i>Carya ovata</i>	Shagbark hickory	92	1.31
<i>Quercus rubra</i>	Northern red oak	78	0.37
<i>Ulmus</i> spp	Elms	78	0.59
<i>Acer saccharum</i>	Sugar maple	78	0.90
<i>Acer rubrum</i>	Red maple	78	0.19
<i>Tilia americana</i>	Basswood	64	0.86
<i>Populus grandidentata</i>	Bigtooth aspen	50	0.31
<i>Quercus alba</i>	White oak	28	0.10
<i>Populus tremuloides</i>	Trembling aspen	28	0.35
<i>Carya cordiformis</i>	Bitternut hickory	21	0.43

AFrDe and AFrDeO

Acer saccharum-Fraxinus americana/

Desmodium glutinosum

Acer saccharum-Fraxinus americana/

Desmodium-Osmorhiza

(Sugar maple-white ash/Tick-trefoil

Sugar maple-White ash/Tick-trefoil-Sweet cicely)

Distribution:

Predominantly in western Sheboygan county but also western Manitowoc and Washington counties. Entirely Natural Subdivision 5b.

Similar types: AFrDe(Vb) (Region 11), ATiFrVb (Region 10):

Landform and soils:

Silt loams and loams over brown calcareous till. Rolling to steep kettle moraine topography common. The **AFrDe** represents **dry-mesic/nutrient rich** sites and **AFrDeO** slightly **more mesic** and somewhat **richer** sites. These differences are expressed either in terms of soil depth, texture or topographic position. Because all of these factors compensate for each other no uniform descriptions of the two site types are possible.

Vegetation:

Common forest cover types: *Sugar maple* is usually dominant and well represented in all size classes. *Red oak* is well represented only in the largest diameter classes. *White ash* and *bass-*

wood are the only other important associates. *American beech* is occasionally found on these types, but is far more prevalent east and north of the kettle moraine region. In contrast to mesic and dry-mesic forests in the western part of the state *white ash* is significantly more important in region 11 and *bitternut hickory* is less important.

Shrub and small tree layer:

Shrub layer is moderately well developed, although where openings in the canopy occur tree seedlings and saplings dominate. Shrubs with high constancy and moderate coverage are *wild currants* and *gooseberries*, *choke cherry*, *black cherry*, *maple-leaf viburnum* and *serviceberry*.

Ground flora characteristics:

Large number of herb species can be found on these types but total coverage varies greatly, depending on density of tree canopy. Where canopy gaps are filled with thickets of *sugar maple* reproduction few herbs are found. The two types share most of the

same flora but each also contains species that have significantly different constancies. The **AFrDe** type has a higher frequency of *wild sarsaparilla*, *common milkweed* and *blue cohosh* while the **AFrDeO** type has higher frequency of *sweet cicely* (*Osmorhiza*), *enchanter's nightshade*, *lopseed*, *bristly greenbrier*, *black snakeroot*, *smooth yellow violet*, and *white avens*.

Disturbance and succession:

In terms of community dynamics

the two habitat types do not appear to differ. In absence of stand-replacing disturbance *sugar maple* dominated communities develop. *Basswood* and especially *white ash* are reproducing well in canopy gaps and are considered to be permanent associates. *Red* and *white oak* do not play important role on these types in absence of disturbance. In fire protected landscapes *sugar maple-white ash-basswood* communities were probably stable in presettlement time.

AFrDe

Understory species in order of decreasing constancy, with average coverage.

Scientific name	Common name	Constancy Coverage	
		%	%
Herbs			
Grasses spp.	Grasses	100	10.75
Polygonatum pubescens	Hairy solomon's seal	100	0.82
Vitis riparia	Riverbank grape	94	0.93
Trillium cernuum	Nodding trillium	94	0.44
Aster macrophyllus	Large-leaved aster	94	4.47
Geranium maculatum	Wild geranium	88	0.79
Smilax herbacea	Carrion flower	82	0.31
Aralia nudicaulis	Wild sarsaparilla	82	1.89
Actaea spp.	Baneberries	76	0.44
Amphicarpa bracteata	Hog peanut	76	3.36
Uvularia grandiflora	Large-flowered bellwort	76	1.85
Caulophyllum thalictroides	Blue cohosh	70	1.67
Desmodium glutinosum	Pointed-leaved tick trefoil	70	3.72
Hepatica americana	Round-lobed hepatica	70	0.63
Smilacina racemosa	False solomon's seal	64	2.07
Triosteum aurantiacum	Orange-fruited horse gentain	58	0.15
Asclepias exaltata	Poke milkweed	58	0.10
Ranunculus abortivus	Small-flowered crowfoot	58	0.15
Thalictrum dioicum	Early meadow rue	52	7.80
Botrychium virginianum	Rattlesnake fern	47	0.16
Podophyllum peltatum	Mayapple	47	5.88
Rhus radicans	Poison ivy	47	0.10
Prenanthes alba	White lettuce	41	0.51
Dryopteris spinulosa	Spinulose shield fern	41	0.51
Lactuca spp.	Wild lettuce	41	0.10
Apocynum androsaemifolium	Spreading dogbane	35	0.27
Galium triflorum	Sweet-scented bedstraw	35	0.20
Galium circaezans	Wild licorice	35	0.18
Anemone virginiana	Thimble weed	35	0.18
Maianthemum canadense	Wild lily-of-the-valley	35	0.27
Adiantum pedatum	Maidenhair fern	29	6.16
Circaea quadrisulcata	Enchanter's nightshade	29	0.10
Osmorhiza claytoni	Sweet cicely	29	0.20
Ranunculus hispidus	Hispid buttercup	29	0.30
Phryma leptostachya	Lopseed	23	0.10
Sanguinaria canadensis	Bloodroot	23	4.80
Veronicastrum virginicum	Culver's root	23	0.10
Shrubs			
Ribes cynosbati	Prickly gooseberry	94	2.31
Prunus virginiana	Chokecherry	88	4.02
Viburnum acerifolium	Maple-leaved viburnum	70	0.71
Viburnum rafinesquianum	Downy arrowwood	52	0.21
Cornus alternifolia	Alternate-leaved dogwood	52	1.18
Xanthoxylum americanum	Prickly ash	47	2.21

continued...

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Scientific name	Common name	Constancy Coverage	
		%	%
Amelanchier spp.	Juneberry	47	0.22
Symphoricarpos albus	Snowberry	35	0.67
Rubus spp.	Blackberries/raspberries	29	0.10
Viburnum lentago	Nannyberry	23	0.10
Tree Seedlings			
Acer saccharum	Sugar maple	100	4.41
Fraxinus americana	White ash	100	7.37
Ostrya virginiana	Ironwood	88	1.04
Tilia americana	Basswood	88	0.39
Prunus serotina	Black cherry	82	0.90
Quercus rubra	Northern red oak	82	0.28
Carya ovata	Shagbark hickory	76	0.67
Acer rubrum	Red maple	52	0.10
Populus grandidentata	Bigtooth aspen	35	0.18
Ulmus spp	Elms	29	0.10
Carya cordiformis	Bitternut hickory	23	0.22
Juglans cinerea	Butternut	23	0.22

AFrDeO

Understory species in order of decreasing constancy, with average coverage.

Scientific name	Common name	Constancy Coverage	
		%	%
Herbs			
Trillium cernuum	Nodding trillium	96	0.47
Grasses spp.	Grasses	93	7.10
Polygonatum pubescens	Hairy solomon's seal	82	1.24
Uvularia grandiflora	Large-flowered bellwort	72	0.94
Amphicarpa bracteata	Hog peanut	72	1.90
Aster macrophyllus	Large-leaved aster	72	3.79
Vitis riparia	Riverbank grape	68	0.42
Actaea spp.	Baneberries	68	0.81
Viola pensylvanica	Smooth yellow violet	68	0.42
Ranunculus abortivus	Small-flowered crowfoot	65	0.31
Osmorhiza claytoni	Sweet cicely	65	0.79
Circaea quadrisulcata	Enchanter's nightshade	62	0.78
Geranium maculatum	Wild geranium	58	1.04
Hepatica acutiloba	Sharp-lobed hepatica	58	0.82
Phryma leptostachya	Lopseed	58	0.65
Smilax herbacea	Carrion flower	58	0.62
Smilacina racemosa	False solomon's seal	55	0.47
Desmodium glutinosum	Pointed-leaved tick trefoil	51	1.68
Geum canadense	White avens	51	0.17
Smilax tamnoides	Bristly greenbrier	48	0.79
Galium asprellum	Cleavers	48	0.21
Sanicula marilandica	Black snakeroot	44	0.25
Thalictrum dioicum	Early meadow rue	44	6.50
Maianthemum canadense	Wild lily-of-the-valley	41	0.55
Botrychium virginianum	Rattlesnake fern	41	0.59
Anemone quinquefolia	Wood anemone	41	0.71
Triosteum aurantiacum	Orange-fruited horse gentain	31	0.21
Podophyllum peltatum	Mayapple	31	5.77
Prenanthes alba	White lettuce	31	0.27
Dryopteris spinulosa	Spinulose shield fern	31	0.42
Solidago spp.	Goldenrods	27	0.35
Arisaema atrorubens	Jack-in-the-pulpit	24	0.10
Parthenocissus quinquefolia	Virginia creeper	20	0.67
Sanguinaria canadensis	Bloodroot	20	0.75
Aralia nudicaulis	Wild sarsaparilla	20	1.15
Galium triflorum	Sweet-scented bedstraw	20	0.75
Shrubs			
Ribes cynosbati	Prickly gooseberry	100	4.02
Prunus virginiana	Chokecherry	93	4.10
Amelanchier spp.	Juneberry	79	1.09
Viburnum acerifolium	Maple-leaved viburnum	72	3.01
Xanthoxylum americanum	Prickly ash	48	2.01
Lonicera spp.	Honeysuckles	41	0.59
Rubus spp.	Blackberries/raspberries	41	0.95

continued...

...continued

Scientific name	Common name	Constancy Coverage	
		%	%
<i>Cornus alternifolia</i>	Alternate-leaved dogwood	37	0.55
<i>Viburnum rafinesquianum</i>	Downy arrowwood	31	0.21
<i>Viburnum lentago</i>	Nannyberry	20	0.18
<i>Hamamelis virginiana</i>	Witch hazel	20	7.63
Trees Seedlings			
<i>Acer saccharum</i>	Sugar maple	100	8.57
<i>Fraxinus americana</i>	White ash	96	5.29
<i>Tilia americana</i>	Basswood	89	1.11
<i>Ostrya virginiana</i>	Ironwood	89	1.78
<i>Prunus serotina</i>	Black cherry	82	1.39
<i>Quercus rubra</i>	Northern red oak	79	0.55
<i>Carya ovata</i>	Shagbark hickory	65	0.52
<i>Ulmus</i> spp	Elms	62	1.73
<i>Carya cordiformis</i>	Bitternut hickory	48	1.55
<i>Quercus alba</i>	White oak	24	0.17
<i>Acer rubrum</i>	Red maple	24	0.10
<i>Fagus grandifolia</i>	American beech	24	0.59

AFTD

Acer saccharum-Fagus-Tsuga/Dryopteris spinulosa (Sugar maple-American beech-Hemlock/ Spinulose shield fern)

Distribution:

Manitowoc, Brown and Kewaunee counties (best represented in eastern parts, Natural Subdivision 3c).

Similar types: AFAs-O (occurs in same area).

Landform and soils:

Level to rolling topography, recessional moraines or other ice-contact glacial deposits. Soils are predominantly sandy loam or loamy sand. Some sites with deep sand and within close proximity of Lake Michigan also fit this type floristically. In spite of relatively coarse soils vegetation on these sites reflects **mesic, medium to rich nutrient conditions**.

Vegetation:

Common forest cover types: *Sugar maple* and *beech* are principal dominants in most stands. In contrast to **AFAs** types, *basswood* and *white ash* are absent or rare, while *hemlock* and *yellow birch* are often present. *Black cherry* is sometimes present as a tree, while on other habitat types it is found only in the sapling and seedling layer.

Shrub and small tree layer: This layer is not well developed in most stands. *Elderberry*, *choke cherry*, *black cherry* and *gooseberries* are the only shrubs with common occurrence. *Sugar maple* saplings most often fill

this layer. *Ironwood* (*Ostrya*) is also much less common than it is on other mesic types of region 11.

Ground flora characteristics: Floristically, **AFTD** type has the appearance of a transitional community between the southern and northern mesic type. Several characteristically southern species are rare or no longer present on this type (e.g.: *Sharp-lobed hepatica*, *lopseed*, *enchanter's nightshade*, *wild geranium*, *white avens*, *Virginia creeper*, and *mayapple*). Conversely, a few predominantly northern species attain high constancy or coverage (e.g.: *Spinulose shield fern*, *wild lily-of-the valley*, *partridgeberry*, *big-leaf aster* and *fly-honeysuckle*).

Disturbance and succession: This is the only habitat type in region 11 where the occurrence of *sugar maple* reproduction does not rank ahead of *American beech*. Significant presence of *yellow birch* and *white ash* saplings was also found, but *hemlock* reproduction was nil. Without major disturbance *beech* and *sugar maple* will continue to dominate. Significant increases of *hemlock* and *yellow birch* cannot be expected unless seed source is substantially increased through management. (Also see this section under **AFAsHa** type description).

AFTD

Understory species in order of decreasing constancy, with average coverage.

Scientific name	Common name	Constancy Coverage	
		%	%
Herbs			
<i>Maianthemum canadense</i>	Wild lily-of-the-valley	100	1.03
<i>Polygonatum pubescens</i>	Hairy solomon's seal	91	1.38
<i>Dryopteris spinulosa</i>	Spinulose shield fern	91	4.78
<i>Actaea</i> spp.	Baneberries	83	1.03
<i>Viola pensylvanica</i>	Smooth yellow violet	83	0.83
Grasses spp.	Grasses	75	0.64
<i>Osmorhiza claytoni</i>	Sweet cicely	66	0.71
<i>Smilacina racemosa</i>	False solomon's seal	66	0.35
<i>Trillium cernuum</i>	Nodding trillium	66	0.41
<i>Arisaema atrorubens</i>	Jack-in-the-pulpit	66	0.95
<i>Ranunculus abortivus</i>	Small-flowered crowfoot	58	0.17
<i>Solanum dulcamara</i>	Bittersweet nightshade	50	0.18
Sedges spp.	Sedges	50	7.78
<i>Galium asprellum</i>	Cleavers	41	0.78
<i>Allium tricoccum</i>	Wild leek	41	0.30
<i>Hepatica americana</i>	Round-lobed hepatica	33	0.35
<i>Impatiens capensis</i>	Jewelweed	33	7.55
<i>Aster macrophyllus</i>	Large-leaved aster	33	1.55
<i>Mitchella repens</i>	Partridgeberry	33	3.83
<i>Caulophyllum thalictroides</i>	Blue cohosh	33	16.42
<i>Aralia nudicaulis</i>	Wild sarsaparilla	25	20.90
<i>Circaea quadrisulcata</i>	Enchanter's nightshade	25	0.10
<i>Vitis riparia</i>	Riverbank grape	25	0.27
<i>Aralia racemosa</i>	Spikenard	25	0.27
Shrubs			
<i>Sambucus pubens</i>	Red-berried elder	100	2.88
<i>Prunus virginiana</i>	Chokecherry	91	2.16
<i>Ribes cynosbati</i>	Prickly gooseberry	75	1.56
<i>Rubus</i> spp.	Blackberries/raspberries	58	0.51
<i>Lonicera canadensis</i>	American fly honeysuckle	41	0.68
<i>Viburnum acerifolium</i>	Maple-leaved viburnum	41	3.76
<i>Ribes lacustre</i>	Bristly black currant	25	0.27
<i>Hamamelis virginiana</i>	Witch hazel	25	1.23
Tree Seedlings			
<i>Acer saccharum</i>	Sugar maple	100	13.15
<i>Fagus grandifolia</i>	American beech	100	3.60
<i>Fraxinus americana</i>	White ash	100	5.88
<i>Prunus serotina</i>	Black cherry	83	1.51
<i>Quercus rubra</i>	Northern red oak	66	0.65
<i>Tilia americana</i>	Basswood	58	0.31
<i>Acer rubrum</i>	Red maple	41	0.30
<i>Ostrya virginiana</i>	Ironwood	33	0.95
<i>Betula alleghaniensis</i>	Yellow birch	25	0.10
<i>Tsuga canadensis</i>	Eastern hemlock	25	5.07

AFH

Acer saccharum-Fagus/Hydrophyllum (Sugar maple-Beech/Virginia waterleaf)

Distribution:

Sheboygan, Manitowoc and Brown counties and eastern part of Ozaukee county. (Natural Subdivision 3c).

Similar types: AFAs, AFAs-O

Landform and soils:

Loams and silt loams over red clay calcareous till. Level to rolling topography. This type is intermixed with **AFAs** and **AFAs-O** types, most commonly on lower topographic positions, or where there is only thin loamy layer over clay. In all cases surface drainage is somewhat impaired. **Mesic/nutrient rich** sites.

Vegetation:

Common forest cover types: *sugar maple* and *white ash* usually dominate. *American Beech* presence is sporadic. Compared with the **AFAs** types *basswood* is less common while *red oak* and, to some extent, *red maple* are present more often. *Ironwood (Ostrya)* is common in the understory.

Shrub and small tree layer: Species with highest constancy are *wild currants* and *gooseberries*, *choke cherry*, *black cherry* and *nannyberry*. Somewhat less frequently present but more characteristic species of this type are *witch hazel* and *blue beech (Carpinus)* which often occur in scattered clumps. *Maple-leaf viburnum* and

gray dogwood were present in about 60% of the stands. Conspicuously absent are *beaked* and *American hazel*.

Ground flora characteristics: *wild geranium*, *enchanter's nightshade* and *Virginia waterleaf* most often constitute the majority of herbaceous cover. Other frequent species are: *trillium*, *solomon's seal*, *baneberry*, *jack-in-the-pulpit*, *white avens* and *wood strawberry*.

Disturbance and succession: Mesic forests are everywhere the most stable of forest community types in a sense that one or the other of the usual two to four canopy species regenerates in any canopy gap. *Sugar maple* almost always dominates the regeneration layer, but other associated tolerant species are also represented to a varying degree. Records of presettlement vegetation suggest that *American beech* was once better represented within its botanical range than it is today. The factors responsible for the differences in regeneration success between *sugar maple* and *American beech* have not been adequately studied in Wisconsin. Current successional trends on the **AFH** type point to continuation of *sugar maple* dominance and strong participation of *white ash* and *American beech*. Other species are relatively unimportant.

AFH

Understory species in order of decreasing constancy, with average coverage.

Scientific name	Common name	Constancy Coverage	
		%	%
Herbs			
<i>Geranium maculatum</i>	Wild geranium	93	7.59
Grasses spp.	Grasses	86	2.33
<i>Circaea quadrisulcata</i>	Enchanter's nightshade	80	4.52
<i>Smilacina racemosa</i>	False solomon's seal	80	1.67
<i>Geum canadense</i>	White avens	80	0.63
<i>Arisaema atrorubens</i>	Jack-in-the-pulpit	80	0.63
<i>Actaea</i> spp.	Baneberries	80	0.35
<i>Hydrophyllum virginianum</i>	Virginia waterleaf	73	3.21
<i>Polygonatum pubescens</i>	Hairy solomon's seal	73	0.15
<i>Trillium cernuum</i>	Nodding trillium	73	1.29
<i>Maianthemum canadense</i>	Wild lily-of-the-valley	66	0.35
<i>Viola pensylvanica</i>	Smooth yellow violet	66	3.76
<i>Fragaria vesca</i>	Wood strawberry	60	0.21
<i>Dryopteris spinulosa</i>	Spinulose shield fern	60	2.57
<i>Aster macrophyllus</i>	Large-leaved aster	60	1.56
<i>Solidago flexicaulis</i>	Zigzag goldenrod	53	0.22
<i>Vitis riparia</i>	Riverbank grape	53	0.59
<i>Smilax herbacea</i>	Carrion flower	53	0.22
<i>Parthenocissus quinquefolia</i>	Virginia creeper	53	6.76
<i>Allium tricoccum</i>	Wild leek	46	0.24
<i>Caulophyllum thalictroides</i>	Blue cohosh	46	0.31
<i>Thalictrum dioicum</i>	Early meadow rue	46	0.51
<i>Sanguinaria canadensis</i>	Bloodroot	46	0.24
<i>Podophyllum peltatum</i>	Mayapple	40	6.03
<i>Hepatica acutiloba</i>	Sharp-lobed hepatica	40	0.67
<i>Galium triflorum</i>	Sweet-scented bedstraw	33	1.36
<i>Ranunculus hispidus</i>	Hispid buttercup	33	0.10
<i>Solanum dulcamara</i>	Bittersweet nightshade	33	0.10
<i>Prenanthes alba</i>	White lettuce	33	0.10
<i>Agrimonia gryposepala</i>	Agrimony	26	0.22
<i>Amphicarpa bracteata</i>	Hog peanut	26	3.95
<i>Ranunculus abortivus</i>	Small-flowered crowfoot	26	0.10
<i>Mitchella repens</i>	Partridgeberry	20	0.43
<i>Triosteum aurantiacum</i>	Orange-fruited horse gentain	20	0.10
<i>Athyrium filix-femina</i>	Lady fern	20	0.43
<i>Lactuca</i> spp	Wild lettuce	20	0.27
<i>Impatiens capensis</i>	Jewelweed	20	0.10
<i>Osmorhiza claytoni</i>	Sweet cicely	20	1.07
<i>Hepatica americana</i>	Round-lobed hepatica	20	0.10
Sedges spp.	Sedges	20	11.00
<i>Epipactis helleborine</i>	Helleborine	20	0.27

Scientific name	Common name	Constancy Coverage	
		%	%
Shrubs			
<i>Ribes cynosbati</i>	Prickly gooseberry	100	3.60
<i>Prunus virginiana</i>	Chokecherry	93	7.72
<i>Viburnum lentago</i>	Nannyberry	80	2.67
<i>Cornus racemosa</i>	Gray dogwood	66	1.02
<i>Hamamelis virginiana</i>	Witch hazel	60	13.81
<i>Amelanchier</i> spp.	Juneberry	53	4.68
<i>Viburnum acerifolium</i>	Maple-leaved viburnum	53	1.01
<i>Xanthoxylum americanum</i>	Prickly ash	53	2.21
<i>Rubus</i> spp.	Blackberries/raspberries	46	0.24
<i>Viburnum rafinesquianum</i>	Downy arrowwood	46	0.66
<i>Lonicera canadensis</i>	American fly honeysuckle	26	1.08
<i>Viburnum trilobum</i>	Highbush cranberry	26	0.10
<i>Rubus parviflorus</i>	White-flowering raspberry	26	4.20
<i>Cornus alternifolia</i>	Alternate-leaved dogwood	20	0.60
<i>Rosa</i> spp.	Roses	20	0.10
<i>Sambucus pubens</i>	Red-berried elder	20	0.10
<i>Ribes</i> spp.	Gooseberries	20	0.10
Tree Seedlings			
<i>Acer saccharum</i>	Sugar maple	100	3.54
<i>Tilia americana</i>	Basswood	93	1.48
<i>Fraxinus americana</i>	White ash	93	7.25
<i>Quercus rubra</i>	Northern red oak	86	0.37
<i>Prunus serotina</i>	Black cherry	80	0.83
<i>Ostrya virginiana</i>	Ironwood	73	1.12
<i>Fagus grandifolia</i>	American beech	73	0.98
<i>Acer rubrum</i>	Red maple	73	0.15
<i>Crataegus</i> spp.	Hawthorns	66	0.49
<i>Carpinus caroliniana</i>	American hornbeam	66	5.01
<i>Carya cordiformis</i>	Bitternut hickory	66	0.35
<i>Ulmus</i> spp.	Elms	60	0.27
<i>Fraxinus nigra</i>	Black ash	46	0.24
<i>Quercus bicolor</i>	Swamp white oak	26	0.10
<i>Quercus alba</i>	White oak	20	0.10
<i>Carya ovata</i>	Shagbark hickory	20	0.10

AFAs and AFAs-O

Acer saccharum-Fagus/Arisaema

(Sugar maple-American beech/Jack-in-the-pulpit) and *Osmorhiza* (Sweet cicely) variant

Distribution:

Sheboygan, Manitowoc and Brown counties and eastern part of Ozaukee county. Natural Sub-division 3c).

Similar types: AFH, AFTD (Primarily Kewaunee and Door counties, Natural Subdivision 3b).

Landform and soils:

Level to rolling topography. **AFAs** type most common on loams and silt loams over red-clay calcareous till. **AFAs-O** is more common on loams and sandy loams on recessional moraines and other ice-contact glacial deposits. Very rocky soil profile. **Mesic/ nutrient rich and very rich sites.**

Vegetation:

Common forest cover types: Various mixtures of *sugar maple*, *white ash*, *American beech* and *basswood* predominate. Presence of *beech* is the most important characteristic. *Red oak* is much less frequent than on **AFrDe** types.

Shrub and small tree layer:

Shrub species are not numerous or well represented on this type. Only *black cherry*, *elderberry* and *wild currants/gooseberries* are

common. Tree saplings generally dominate this layer.

Ground flora characteristics:

Several species, typical of rich mesic forests of all regions, are much better represented on this type than on the **Acer-Fraxinus** types of region 11. Some of these are: *Virginia waterleaf*, *zig-zag goldenrod*, *bloodroot*, *jack-in-the-pulpit*, *blue cohosh*, *wild leek* and *sharp-lobed hepatica*.

Floristic differences between **AFAs** and the **Osmorhiza variant** while not great suggest some ecological difference that may be important. We draw this conclusion on the basis of data from relatively large number of stands of each type. The **Osmorhiza** variant has significantly higher constancy values for the following species: *sharp-lobed hepatica*, *sweet cicely*, *rattlesnake fern*, *large-leaf aster*, and *wild lily-of-the-valley*. Conversely, the **AFAs** has better representation of *enchanter's nightshade*, *river-bank grape*, *wild geranium* and *jack-in-the-pulpit*.

Disturbance and succession:

See description under AFH type.

AFAs

Understory species in order of decreasing constancy, with average coverage.

Scientific name	Common name	Constancy Coverage	
		%	%
Herbs			
<i>Circaea quadrisulcata</i>	Enchanter's nightshade	97	3.06
<i>Actaea</i> spp.	Baneberries	81	1.38
<i>Trillium cernuum</i>	Nodding trillium	81	0.68
<i>Arisaema atrorubens</i>	Jack-in-the-pulpit	78	2.27
<i>Smilacina racemosa</i>	False solomon's seal	73	5.36
<i>Vitis riparia</i>	Riverbank grape	71	0.32
<i>Geum canadense</i>	White avens	68	0.94
Grasses spp.	Grasses	65	0.28
<i>Geranium maculatum</i>	Wild geranium	52	4.60
<i>Parthenocissus quinquefolia</i>	Virginia creeper	52	1.81
<i>Caulophyllum thalictroides</i>	Blue cohosh	52	0.69
<i>Viola pensylvanica</i>	Smooth yellow violet	47	2.97
<i>Podophyllum peltatum</i>	Mayapple	47	4.17
<i>Sanguinaria canadensis</i>	Bloodroot	47	0.38
Sedges spp.	Sedges	47	11.58
<i>Allium tricoccum</i>	Wild leek	44	0.51
<i>Polygonatum pubescens</i>	Hairy solomon's seal	42	0.38
<i>Thalictrum dioicum</i>	Early meadow rue	39	6.01
<i>Dryopteris spinulosa</i>	Spinulose shield fern	39	0.43
<i>Hydrophyllum virginianum</i>	Virginia waterleaf	34	0.88
<i>Ranunculus abortivus</i>	Small-flowered crowfoot	26	0.20
<i>Smilax herbacea</i>	Carrion flower	23	0.10
<i>Amphicarpa bracteata</i>	Hog peanut	23	0.53
<i>Solanum dulcamara</i>	Bittersweet nightshade	23	0.16
<i>Epipactis helleborine</i>	Helleborine	23	0.16
Shrubs			
<i>Prunus virginiana</i>	Chokecherry	100	9.55
<i>Ribes cynosbati</i>	Prickly gooseberry	92	4.64
<i>Rubus</i> spp.	Blackberries/raspberries	55	0.17
<i>Sambucus pubens</i>	Red-berried elder	50	2.38
<i>Cornus alternifolia</i>	Alternate-leaved dogwood	39	1.97
<i>Xanthoxylum americanum</i>	Prickly ash	28	3.43
<i>Viburnum acerifolium</i>	Maple-leaved viburnum	28	0.24
<i>Viburnum lentago</i>	Nannyberry	26	0.78
<i>Cornus racemosa</i>	Gray dogwood	23	2.13
<i>Lonicera canadensis</i>	American fly honeysuckle	21	2.04
Tree Seedlings			
<i>Acer saccharum</i>	Sugar maple	100	15.41
<i>Fraxinus americana</i>	White ash	97	9.04
<i>Tilia americana</i>	Basswood	78	0.56
<i>Prunus serotina</i>	Black cherry	78	2.29
<i>Ulmus</i> spp.	Elms	71	2.03
<i>Carya cordiformis</i>	Bitternut hickory	63	1.67
<i>Fagus grandifolia</i>	American beech	57	3.30
<i>Ostrya virginiana</i>	Ironwood	55	0.42
<i>Quercus rubra</i>	Northern red oak	50	0.46
<i>Carya ovata</i>	Shagbark hickory	28	0.76

AFAs-O

Understory species in order of decreasing constancy, with average coverage.

Scientific name	Common name	Constancy %	Coverage %
Herbs			
<i>Actaea</i> spp.	Baneberries	95	0.82
<i>Viola pensylvanica</i>	Smooth yellow violet	90	2.13
<i>Polygonatum pubescens</i>	Hairy solomon's seal	86	0.59
<i>Osmorhiza claytoni</i>	Sweet cicely	81	1.63
<i>Smilacina racemosa</i>	False solomon's seal	77	1.75
<i>Caulophyllum thalictroides</i>	Blue cohosh	72	0.68
<i>Trillium cernuum</i>	Nodding trillium	68	1.94
Grasses spp.	Grasses	68	0.47
<i>Hepatica acutiloba</i>	Sharp-lobed hepatica	68	2.90
<i>Circaea quadrisulcata</i>	Enchanter's nightshade	63	1.34
<i>Sanguinaria canadensis</i>	Bloodroot	54	0.43
<i>Phryma leptostachya</i>	Lopseed	54	0.51
<i>Ranunculus abortivus</i>	Small-flowered crowfoot	50	0.25
<i>Maianthemum canadense</i>	Wild lily-of-the-valley	45	0.78
<i>Geum canadense</i>	White avens	45	0.25
<i>Galium asprellum</i>	Cleavers	45	0.35
<i>Allium tricoccum</i>	Wild leek	45	0.40
<i>Aster macrophyllus</i>	Large-leaved aster	40	6.29
<i>Botrychium virginianum</i>	Rattlesnake fern	40	0.21
<i>Uvularia grandiflora</i>	Large-flowered bellwort	36	0.71
<i>Arisaema atrorubens</i>	Jack-in-the-pulpit	36	0.29
<i>Parthenocissus quinquefolia</i>	Virginia creeper	36	2.15
<i>Dryopteris spinulosa</i>	Spinulose shield fern	36	0.65
<i>Hydrophyllum virginianum</i>	Virginia waterleaf	36	0.65
<i>Smilax herbacea</i>	Carrion flower	27	0.10
<i>Podophyllum peltatum</i>	Mayapple	22	0.30
<i>Amphicarpa bracteata</i>	Hog peanut	22	0.20
<i>Anemone quinquefolia</i>	Wood anemone	22	3.66
<i>Galium circaeazans</i>	Wild licorice	22	0.10
<i>Solidago</i> spp.	Goldenrods	22	0.50
Sedges spp.	Sedges	22	3.18
Shrubs			
<i>Ribes cynosbati</i>	Prickly gooseberry	90	1.85
<i>Sambucus pubens</i>	Red-berried elder	86	1.27
<i>Prunus virginiana</i>	Chokecherry	81	4.72
<i>Rubus</i> spp.	Blackberries/raspberries	50	0.15
<i>Viburnum acerifolium</i>	Maple-leaved viburnum	40	2.13
<i>Xanthoxylum americanum</i>	Prickly ash	31	4.84
<i>Cornus alternifolia</i>	Alternate-leaved dogwood	27	0.18
Tree Seedlings			
<i>Acer saccharum</i>	Sugar maple	95	12.32
<i>Fraxinus americana</i>	White ash	90	2.47
<i>Fagus grandifolia</i>	American beech	86	3.40
<i>Prunus serotina</i>	Black cherry	81	0.69
<i>Ostrya virginiana</i>	Ironwood	72	0.83
<i>Tilia americana</i>	Basswood	72	0.47
<i>Quercus rubra</i>	Northern red oak	45	0.10
<i>Ulmus</i> spp.	Elms	40	0.80
<i>Carya cordiformis</i>	Bitternut hickory	40	0.38

Occurrence of Tree Species on Habitat Types of Region 11

Size classes: SE - seedlings; SA - saplings; MT - medium trees (4-10" DBH); LT - large trees (>10" DBH). Numbers are frequency of occurrence: * <10%; 1, 10-25%; 2, 26-50%; 3, 51-75%; 4, 76-100%. Letters are coverage classes: A <5%; B 5-15%; C 16-35%; D >35%.

	AFrDe(Vb)				AFrDe				AFrDeO				AFH				AFAs				AFAs-O				AFTD				
	SE	SA	MT	LT	SE	SA	MT	LT	SE	SA	MT	LT	SE	SA	MT	LT	SE	SA	MT	LT	SE	SA	MT	LT	SE	SA	MT	LT	
Jack pine																													
Bur oak			*				*							*	*	*													
Northern pin oak																													
Trembling aspen	2 A	*	*	1 C	*				*			*	1 A	1 A	*	*	*			*									
Bigtooth aspen	2 A	1 A	1 B	2 C	2 A	1 A	1 B	1 D	1 A	1 A	1 B	1 C	1 A		1 B	*	*		*										
Red pine							*	*																					
Black oak				*								*																	
Black walnut																	*	*											
Paper birch			1 B		*	*	2 B	*		*	1 B	*			2 B	2 C			*	1 A		*				2 A	1 B		
Black ash					1 A	*							2 A	2 A	*		1 A	1 A	*		*			1 A					
Northern red oak	2 A	1 A	3 C	4 C	1 A	*	3 C	4 D	2 A	1 A	2 B	3 C	3 A	*	2 B	3 C	1 A	*	1 B	2 C	1 A	*	*	2 B	*		1 B		
White pine											*	*			1 A	3 B			*	*						*	1 B		
White oak	*	*	2 C	2 B	*		2 A	1 C	*		1 A	2 B	*	*	1 A	2 C			*	*									
Butternut				*	1 A				1 A								*			*									
Swamp white oak											*		1 A		*			*											
Shagbark hickory	4 A	2 B	2 C	1 B	3 A	2 A	1 B	*	2 A	*	2 B	*	*				1 A	1 A	1 B	*		*							
Black cherry	4 A	3 A	1 B	*	3 A	1 A	1 B		3 A	1 B	*		4 A	2 A	1 B		4 A	2 A	1 B	1 B	3 A	1 A	1 B	*	4 A	1 A	* 1 B		
Box elder	*								1 A	*	*		*	*			1 A	*											
Hackberry																													
Elms	3 A	2 A			*		*		2 A	1 B	1 B	*	3 A	1 B			3 A	2 B	1 B	*	2 A	1 A	1 B	*			*		
American elm																													
White ash	4 B	4 C	2 B	1 B	4 B	4 B	3 C	2 B	4 B	3 B	2 B	2 C	4 B	3 B	3 C	3 C	4 B	3 B	2 B	2 C	4 A	2 B	1 B	2 B	4 B	1 C	1 B	2 B	
Green ash													*	*			*												
Yellow birch			*	*								*							*						*	*	1 A	2 C	
Bitternut hickory	1 A	*			*		1 A		2 A	1 B	1 B	*	3 A	2 A	1 B		3 A	1 B	1 B	1 C	2 A	1 A	1 B	*	*				
Red maple	3 A	3 C	3 C	1 C	2 A	2 B	3 C		1 A	1 A	1 C		2 A	2 B	3 C	2 C	*	*	1 B	*		*	1 B	*	*	1 B	3 B	2 C	
American hornbeam		*			*	*			*	*			3 B	3 B			*	1 A	*	*		*	*		*				
Ironwood	4 A	4 C	2 B		3 A	3 B	1 B		4 A	3 C	2 B		3 A	4 C	3 C		2 A	2 B	1 B		2 A	2 B	1 B	*	1 A	2 B	1 B		
Basswood	2 A	3 A	1 B	1 A	3 A	3 B	2 B	2 B	4 A	3 B	2 B	2 B	4 A	3 B	2 C	2 C	3 A	2 B	2 B	2 C	2 A	2 A	1 B	2 B	2 A	*	1 A	1 C	
Eastern hemlock										*	*								*	*	*	*	*	*	*	1 B	2 A	3 B	2 B
American beech		1 A	*	*	*				1 A	1 B	1 B	1 B	3 A	3 B	3 C	3 B	2 A	2 B	2 C	2 C	4 A	4 B	2 B	3 C	4 A	4 B	3 B	3 C	
Sugar maple	3 A	4 B	3 C	2 C	4 A	4 C	4 C	3 D	4 B	4 C	4 C	3 D	4 A	4 C	4 C	3 C	4 B	4 C	4 C	4 D	4 B	4 C	4 C	4 D	3 B	4 C	4 C	3 D	

Understory Species with Potential Diagnostic Value for Distinguishing Among the Habitat Types of Region 11

Number represent frequency of occurrence classes: * 10-25%; 1, 26-50%; 2, 51-75%; 3, 76-100%. Letters are coverage classes: A<5%; B 6-15%; C>15%.

Scientific Name	Common Name	AFrDe(Vb)		AFrDeO		AFAs-O		AFH
		AFrDe		AFAs	AFTD			
Herbs								
<i>Agrimonia gryposepala</i>	Agrimony	1 A						1 A
<i>Conopholis americana</i>	Squawroot	1 A	*					
<i>Asclepias exaltata</i>	Poke milkweed	*	2 A					
<i>Apocynum androsaemifolium</i>	Spreading dogbane	*	1 A					
<i>Aralia racemosa</i>	Spikenard	*		*			*	
<i>Adiantum pedatum</i>	Maidenhair fern		1 B	*				
<i>Anemone virginiana</i>	Thimble weed		1 A	*				
<i>Sanicula marilandica</i>	Black snakeroot		*	1 A				
<i>Galium circaezans</i>	Wild licorice		1 A	*		*		
<i>Rhus radicans</i>	Poison Ivy	1 A	1 A	*				*
<i>Desmodium nudiflorum</i>	Naked-flowered tick trefoil	*	*	*				
<i>Prenanthes alba</i>	White lettuce	1 A	1 A	1 A				1 A
<i>Desmodium glutinosum</i>	Pointed-leaved tick trefoil	2 B	2 A	2 A				
<i>Triosteum aurantiacum</i>	Orange-fruited horse gentain	2 A	2 A	1 A			*	
<i>Osmorhiza claytoni</i>	Sweet cicely	1 A	1 A	2 A		3 A	2 A	*
<i>Aralia nudicaulis</i>	Wild sarsaparilla	*	3 A	*			* C	
<i>Smilax tannoides</i>	Bristly greenbrier	*	*	1 A	*			*
<i>Geranium maculatum</i>	Wild geranium	3 A	3 A	2 A	2 A	*		3 B
<i>Thalictrum dioicum</i>	Early meadow rue	2 A	2 B	1 B	1 B	*		1 A
<i>Vitis riparia</i>	Riverbank grape	3 A	3 A	2 A	2 A		*	2 A
<i>Amphicarpa bracteata</i>	Hog peanut	2 A	3 A	2 A	*	*		1 A
<i>Uvularia grandiflora</i>	Large-flowered bellwort	1 A	3 A	2 A	*	1 A		
<i>Trillium cernuum</i>	Nodding trillium	3 A	3 A	3 A	3 A	2 A	2 A	2 A
<i>Aster macrophyllus</i>	Large-leaved aster	2 B	3 A	2 A	*	1 B	1 A	2 A
<i>Polygonatum pubescens</i>	Hairy solomon's seal	2 A	3 A	3 A	1 A	3 A	3 A	2 A
<i>Actaea spp.</i>	Baneberries	1 A	3 A	2 A	3 A	3 A	3 A	3 A
<i>Smilacina racemosa</i>	False solomon's seal	2 A	2 A	2 A	2 B	3 A	2 A	3 A
<i>Ranunculus abortivus</i>	Small-flowered crowfoot	1 A	2 A	2 A	1 A	1 A	2 A	1 A
<i>Dryopteris spinulosa</i>	Spinulose shield fern	1 A	1 A	1 A	1 A	1 A	3 A	2 A
<i>Viola pensylvanica</i>	Smooth yellow violet	*	*	2 A	1 A	3 A	3 A	2 A
<i>Circaea quadrifida</i>	Enchanter's nightshade	1 A	1 A	2 A	3 A	2 A	*	3 A
<i>Maianthemum canadense</i>	Wild lily-of-the-valley		1 A	1 A	*	1 A	3 A	2 A
<i>Parthenocissus quinquefolia</i>	Virginia creeper	1 A		*	2 A	1 A	*	2 B
<i>Smilax herbacea</i>	Carrion flower	2 A	3 A	2 A	*	1 A		2 A
<i>Geum canadense</i>	White avens	*	*	2 A	2 A	1 A		3 A
<i>Hepatica acutiloba</i>	Sharp-lobed hepatica		*	2 A	*	2 A		1 A
<i>Phryma leptostachya</i>	Lopseed		*	2 A	*	2 A	*	
<i>Hepatica americana</i>	Round-lobed hepatica		2 A	*			1 A	*
<i>Podophyllum peltatum</i>	Mayapple		1 B	1 B	1 A	*		1 B
<i>Sanguinaria canadensis</i>	Bloodroot		*	*	1 A	2 A		1 A
<i>Solidago flexicaulis</i>	Zigzag goldenrod		*		*			2 A
<i>Hydrophyllum virginianum</i>	Virginia waterleaf				1 A	1 A		2 A

continued...

...continued

Scientific Name	Common Name	AFrDe(Vb)		AFrDeO		AFAs-O		AFH
		AFrDe		AFAs	AFTD			
<i>Arisaema atrorubens</i>	Jack-in-the-pulpit		*	*	3A	1A	2A	3A
<i>Caulophyllum thalictroides</i>	Blue cohosh		2A	*	2A	2A	1C	1A
<i>Allium tricoccum</i>	Wild leek		*	*	1A	1A	1A	1A
<i>Galium triflorum</i>	Sweet-scented bedstraw		1A	*		*		1A
<i>Botrychium virginianum</i>	Rattlesnake fern		1A	1A		1A	*	
<i>Solanum dulcamara</i>	Bittersweet nightshade				*		1A	1A
<i>Impatiens capensis</i>	Jewelweed						1B	*
<i>Mitchella repens</i>	Partridgeberry						1A	*
<i>Ranunculus hispidus</i>	Hispid buttercup		1A				*	1A
<i>Fragaria vesca</i>	Wood strawberry			*				2A
Shrubs								
<i>Symphoricarpos albus</i>	Snowberry		1A					
<i>Viburnum rafinesquianum</i>	Downy arrowwood	3A	2A	1A				1A
<i>Amelanchier</i> spp.	Juneberry	3A	1A	3A	*			2A
<i>Viburnum acerifolium</i>	Maple-leaved viburnum	3A	2A	2A	1A	1A	1A	2A
<i>Cornus alternifolia</i>	Alternate-leaved dogwood	2A	2A	1A	1A	1A	*	*
<i>Cornus racemosa</i>	Gray dogwood	2A		*	*			2A
<i>Xanthoxylum americanum</i>	Prickly ash		1A	1A	1A	1A		2A
<i>Hamamelis virginiana</i>	Witch hazel	*	*	*	*		*	2B
<i>Sambucus pubens</i>	Red-berried elder				1A	3A	3A	*
<i>Lonicera canadensis</i>	American fly honeysuckle		*		*		1A	1A
<i>Crataegus</i> spp.	Hawthorns	*						2A
<i>Viburnum trilobum</i>	Highbush cranberry				*			1A
<i>Rubus parviflorus</i>	White-flowering raspberry						1A	

Summary of Forest Community Dynamics and Implications for Management

In order to understand current trends in composition of existing forest communities and to develop management plans for achieving desired objectives it is necessary to examine the history of the development of various forest types.

Forest composition of any area is controlled primarily by climate, soil properties and disturbance regimes. Over prolonged periods without major disturbance forest communities tend to become dominated by species that are tolerant of shade and other conditions of understory environment. This tolerance allows for the development of advance regeneration which can eventually capture relatively small canopy openings created by the death of individual trees. On mesic to dry-mesic, nutrient rich sites, throughout Wisconsin, sugar maple is the most successful species to accomplish this. Common associates of sugar maple under such conditions are basswood, white ash and, in some regions, yellow birch and American beech. On drier, less fertile sites, red maple or white pine usually fill this role. Some larger-scale disturbance than the dying of individual trees is required to perpetuate other, less shade tolerant species such as oaks, pines, aspen and birch.

In northern Wisconsin extensive fires were relatively rare in pre Euro-American settlement period and mesic hardwood dominated forests were widespread. However, throughout much of southern Wisconsin (south of the floristic "tension zone") fire was a regular disturbance agent for at least 5000 years prior to Euro-American settlement. Because of differential sensitivity of tree species to fire damage, the communities in existence prior to Euro-American settlement were clearly related to the frequency and intensity of fires. All mesic hardwoods, particularly sugar maple, are easily killed by fire at all stages of growth. Oaks, on the other hand, have many adaptations to fire environment. Saplings and seedlings of all oak species native to Wisconsin sprout readily when tops are killed, while old oak trees have relatively thick bark which protects them from fire damage. These old trees are not easily killed and thus remain on the landscape and serve as seed source.

Under the presettlement fire regime in southern Wisconsin mesic forests could persist only on those landscapes where fires were less frequent and less severe. Vegetation maps based on records from original land

surveys show that such forests occurred where rivers, lakes or wetlands formed firebreaks against fires driven by the prevailing southwesterly winds. Landscapes subject to moderate fire frequency supported oak forests, while those more frequently burned supported oak openings or other savanna types.

It must be emphasized that conditions that shaped most of the forest communities we see today in southern Wisconsin no longer exist. Therefore we cannot expect to see similar forests in the future without management.

Dry-mesic and Mesic Sites

Figure 4.1 illustrates how forests are expected to change under continuous fire suppression and how management can redirect some of the pathways.

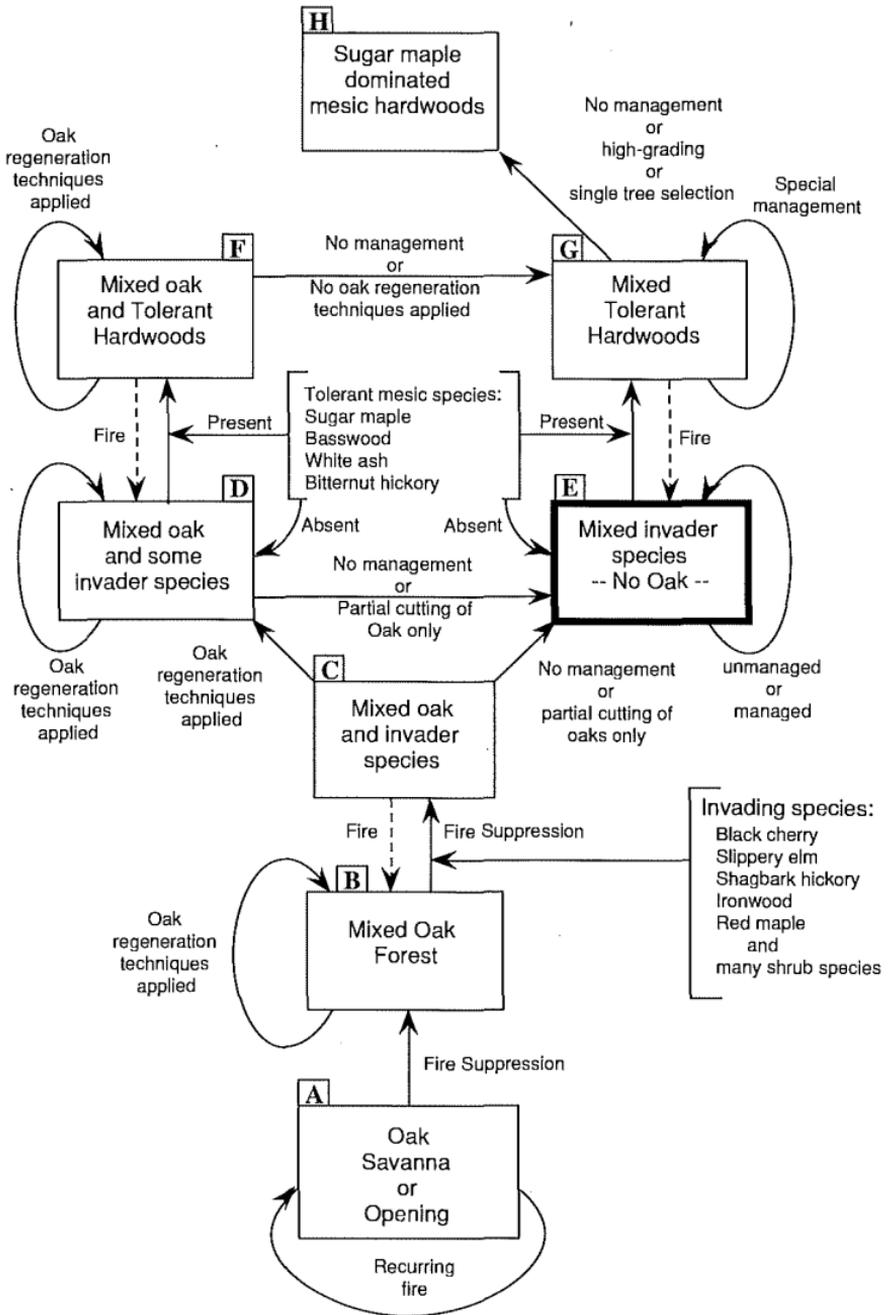
Boxes **A** through **H** represent forest cover types most typically found on mesic and dry-mesic sites today and the arrows indicate observed and expected change in composition.

The most widespread vegetation types at the time of Euro-American settlement were oak opening and oak savanna (box **A**). Because these oak communities had relatively open canopies and were relatively free of shrubs and advance regeneration of other tree species, oak regeneration quickly appeared as wild fires were stopped by settlers. Thus the first generation forests, fol-

lowing the cessation of fire, were generally mixed oak (box **B**). If these forests were utilized for wood and subjected to light grazing, oak composition was maintained for some time. However, with time a number of moderately tolerant species (e.g.: black cherry, slippery elm, shagbark hickory, and sometimes red maple and ironwood) invaded oak woodlands forming mixed community commonly seen today (box **C**). These mixed communities typically lack any appreciable oak seedlings and saplings, because light conditions are no longer adequate. If only partial cutting of oaks is practiced the composition eventually shifts toward dominance of mid-tolerant, invading species listed above (box **E**). This type of woodlands are common throughout southern Wisconsin and some foresters refer to them as "central hardwoods". Their principal characteristic is virtual absence of oaks, as well as the mesic hardwoods.

Further development of these mixed forest communities depends largely on the type of forest management and on presence or absence of seed source of more shade tolerant hardwoods such as sugar maple, basswood, American beech, white ash and bitternut hickory. In the absence of any of these species the composition of mixed "central hardwoods" changes only in response to cutting practices or other distur-

**Figure 4.1. Forest Community Dynamics
(with and without management)
on Mesic and Dry-Mesic Sites in Southern Wisconsin**



bances, but only the mid-tolerant species named above play a role. No significant participation of oaks can be expected. However, if seed source of any of the tolerant hardwoods is present these species slowly invade the mixed hardwoods and with time largely displace them (box **G**). In terms of economic value mixed forests of sugar maple, basswood, ash and bitternut hickory are preferred to "central hardwoods." However, this mixture of tolerant hardwoods is itself not a compositionally stable community. Exclusion of management, or application of single-tree selection technique gradually transform mixed forests into sugar maple dominated communities (box **H**).

There is one other important forest type found on mesic and dry-mesic sites in parts of southern Wisconsin: mixed oak (red and white) and tolerant mesic hardwoods (box **F**). This type is particularly common in Region 7 and in the northern unit of the Kettle-Moraine State Forest (Region 11). There appear to be two principal ways this type of forest developed. The majority of this forest type is found in those areas that experienced less frequent historic fires and were part of the presettlement vegetation. However, other such communities developed as tolerant mesic hardwoods invaded oak forests that had their origin in savanna or oak openings as described above

(boxes **A-D**). Many of these forests today contain some of the highest quality red and white oak, but without proper management are rapidly succeeding to tolerant hardwoods.

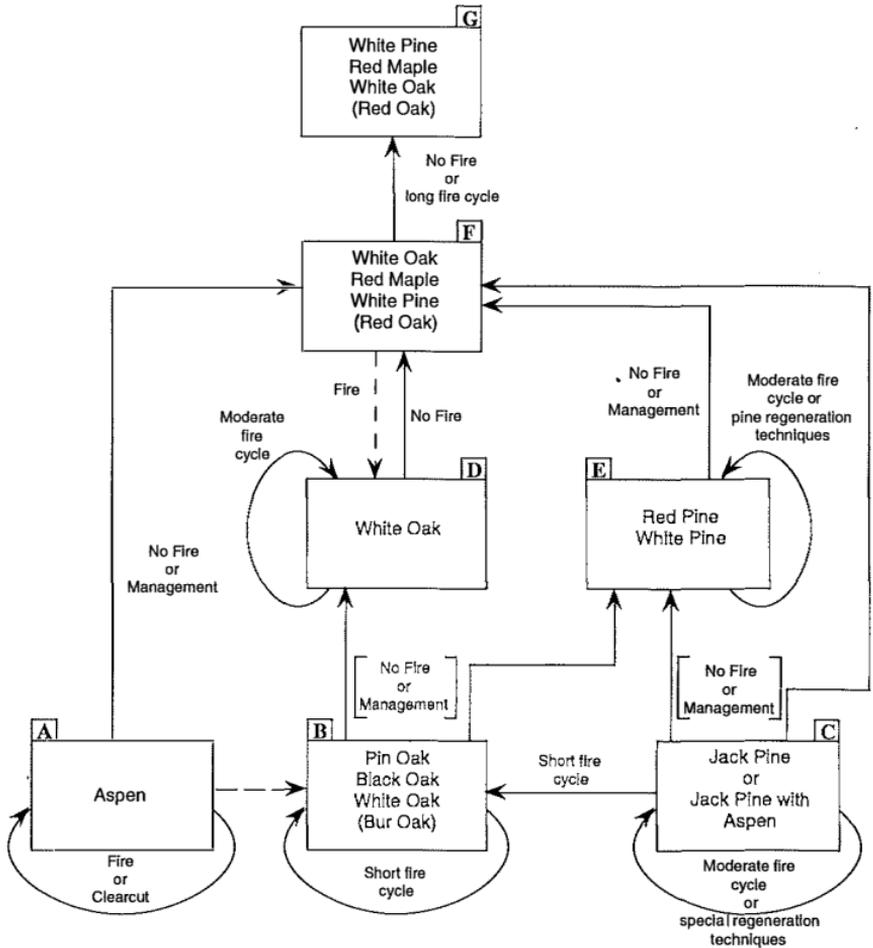
Dry Sites

Perhaps the most important characteristic of dry, nutrient-poor to nutrient-medium sites is that they do not support any of the tree species that are ranked near the top of the shade tolerance scale (e.g. sugar maple, American beech, basswood, ironwood, hemlock). Species composition of these forest communities is even more strongly controlled by disturbance regimes than it is on the mesic and dry-mesic sites.

Figure 4.2 illustrates the most commonly found forest types and relationships among them as influenced by various disturbance regimes. Any of the seven forest cover types (boxes **A-G**) can represent a pioneer stage under a favorable combination of fire disturbance and availability of seed sources. However, subsequent successional development follows somewhat limited and more predictable pathways.

In presettlement time fairly extensive areas of pine, oak, or pine-oak "barrens" existed (box **B**). These were apparently maintained by fire cycles of different lengths. Where fires were most frequent mixed "scrub oak" communities were found because

Figure 4.2. Forest Community Dynamics on Dry Sites in Southern Wisconsin (with or without management)



pine seed sources were eliminated by fire while oak species were able to resprout. If fire cycle is lengthened, or eliminated, and the original oak community contained white oak, the community will gradually shift toward white oak dominance (box D) because white oak is considerably more

shade tolerant than are other oak species. As pin oak, bur oak and black oak drop out of the community red maple and white pine appear in the understory, providing nearby seed source exists. Black cherry is also a common invader, but on these sites rarely develops beyond a sapling size. If

fire suppression continues a mixed forest of white oak, red maple, white pine and, in some cases, red oak develops (box **F**). Once such a forest is established it can maintain itself in the absence of fire because all member species are moderately shade tolerant and forests on these sites generally do not develop as dense canopies as are possible on the more mesic sites. However, relative proportions and spatial distribution of species can be expected to vary as a function of canopy dynamics and seed source proximity. Because of its superior stature and longevity white pine is expected to maintain itself in the upper canopy with red maple and oaks comprising the second canopy (box **G**). This type of forest community can also be maintained by a relatively long fire cycle. If white oak were not present in the "original" community the white oak stage (box **D**) would be skipped.

Where fire cycle was longer (perhaps 20-80 years) jack pine communities often developed (box **C**). It is not clear what conditions were responsible for the lack of oaks in such communities. It appears that jack pine communities can be maintained only under fire cycles of moderate length. Increased fire frequency would gradually eliminate jack

pine seed source as well as jack pine seedlings and saplings and would probably lead to the development of an "oak barren" (box **B**). On the other hand, an extended period without fire allows for the encroachment by red pine, white pine, red maple or white oak (box **E** or **F**).

Aspen communities, particularly big-tooth aspen, also occur on these sites (box **A**). As in the case of jack pine it is not known precisely what conditions lead to the initial development of pure aspen communities. Once in place, they can only be maintained by fire or clearcutting. In the absence of such disturbances aspen communities rapidly succeed to red maple, white pine, white oak or a mixture of these (box **F**). Red and jack pine do not invade aspen communities of normal densities. However, white, black and pin oaks do slowly encroach on aspen stands and they eventually assume dominance. Fire can be expected to speed up this process.

Because wild fires are no longer a significant factor in shaping today's forests silvicultural techniques must be applied any time the direction of change, as depicted in **Figure 4.2**, does not lead to desired conditions or does not meet owner's management objectives.

Management Implications

This guide is not intended as a manual for specific management prescriptions, because these depend on management objectives and a host of other internal and external factors. However, it is a tool to help assess the biological potential of a given site and to identify ecological and silvicultural alternatives for a given stand or a forest community.

In this section habitat types are grouped on the basis of their ecological similarities important

for management. Types from different regions (and sometimes from the same region) that differ in the specifics of floristic composition, but are presumed to have similar potential for growth of tree species and community dynamics, were grouped together. The emphasis here is on trees, because they represent the dominant component of forest ecosystems and are generally the focus of management activities regardless of management goals.

Habitat Type Group 1 (Dry sites; White pine habitat type series): PVGy, PEu, PVCr, PVG

Site characteristics: These types represent sandy, dry, nutrient poor to medium sites. Parent material is either outwash deposits or residual material over sandstone. Terrain is generally flat to gently rolling except for the PVGy and PVCr type which also occur on steep slopes and narrow ridges.

Principal cover types: Almost any mixture of the following species can be found: pin oak, white oak, black oak, jack pine, red pine, white pine, aspen and red maple. The oaks and red maple are present with highest

constancy. Red oak is generally absent.

Regeneration: Red maple, white oak, pin oak and black cherry are generally best represented in the sapling layer. White pine regenerates well under any cover type on these habitat types where seed source is present. Jack pine, aspen and bur oak appear to be more dependent on fire or logging for regeneration.

Growth potential: From the forestry standpoint the three pine species have the highest potential, although red, and especially white pine, show only moderate

to poor growth compared with their potential on dry-mesic habitat types. White oak, black oak, pin oak and big-tooth aspen also reach merchantable size, but only as pulpwood or fuel wood. Red maple and especially black cherry seldom grow beyond the sapling or small pole size.

Other management considerations: From the ecological point of view there are many reasons for maintaining the presence of other, less productive species on these habitat types. Soils on these types are generally

very low in nutrients and organic matter. Coniferous foliage is not a good source of mineral nutrients and in addition it promotes loss of soil nutrients through leaching. The foliage of the less productive deciduous species is richer in nutrients than is conifer foliage and thus contributes greatly to nutrient build up through litter fall.

Mixed coniferous-deciduous forests also provide habitat for a greater variety of wildlife and are less susceptible to catastrophic destruction by insects, disease or severe climatic conditions.

Habitat Type Group 2 (Dry and dry-mesic sites with seasonal influence of ground water; White pine habitat type series): PVHa, PVRh

Site characteristics: These two habitat types occur on same soil parent material as habitat types of group 1 (sand), but are subject to seasonally high water table. PVHa occurs on rolling terrain controlled by bedrock. Seasonal soil saturation occurs in the C horizon as a result of impeded drainage due to a layer of shaly residuum. The PVRh type, on the other hand, occurs on level topography where local ground water table is near the surface (usually within 1-3 feet).

Principal cover types: Red maple, pin oak, white oak, aspen and white pine, in various mix-

tures, are most common. White pine is somewhat better represented on the PVRh type and red oak sometimes occurs on the PVHa. Black cherry is much less common on both types than it is on habitat types of group 1.

Regeneration: Red maple is the best represented sapling on both types. If seed source is available white pine is often the second best represented sapling on the PRh type. White oak and pin oak are the only other commonly occurring saplings.

Growth potential: White pine, red maple, aspen and white birch clearly show better growth on

these types than on types of group 2.

Other management considerations: Although clearcutting is commonly used to regenerate the intolerant species, it should be used with caution on the PVRh type because of possibility of "swamping" the site as a result of

reduced transpiration. Regeneration of most species is often difficult under such conditions. Various forms of shelterwood cutting, or a system of small, scattered openings, are better suited for these habitat types. In addition, any silvicultural activity should probably be restricted to winter.

Habitat Type Group 3 (Dry-mesic sites; Red maple habitat type series): ArDe, ArDe-V, ArCi, ArCi-Ph, AARVb, AARL, AQVb-Gr

Site characteristics: A wide range of soil/site combinations support these habitat types. Deep loamy sands or shallow loams and silt loams over sand or bedrock are most common. The sites are characterized by dry-mesic medium-nutrient conditions.

Principal cover types: Various mixtures of white oak, red oak, black oak and red maple are most characteristic. White pine and black cherry are frequent associates. A feature that strongly distinguishes this group from group 2 is the sporadic occurrence of some of the mesic hardwoods (sugar maple, basswood, white ash, ironwood) although these are generally not well represented.

Regeneration: Red maple is the best adapted species to replace all others in the absence

of disturbance. White oak, and even red oak, often show appreciable regeneration. White pine saplings can also be very prolific if local seed sources exist.

Growth potential: The species that reach at least moderate growth potential on these types are red oak, white oak and red maple. Near optimal growth can be expected for white pine, red pine, black oak and big-tooth aspen. Of the mesic hardwoods basswood and white ash appear to grow better than does sugar maple.

Other management considerations: These habitat types probably offer the best opportunities for continuous management of valuable red and white oak, because competition from the mesic hardwoods, if they occur at all, is least intense. In many areas white pine seed source is

entirely lacking, either due to pre-settlement fire regime or subsequent logging.

Re-introduction of this species could expand management options because white pine has similar

light requirements as the oaks. Because stands on these types entirely lack a conifer component the addition of white pine would expand wildlife opportunities and biodiversity.

Habitat Type Group 4

(Dry-mesic to mesic sites; Sugar maple-Basswood and Sugar maple-White ash habitat type series; post-savanna phases): AFrDe(Vb), ATiFrVb(Cr), ATiFrCa(O), ATiDe(Pr), ATiCr(O), ATiCr(As), ATiAs(De)

Site characteristics: The types in this group occur over a variety of landforms, but generally share in common moderately deep to deep silt loams or loams. Thus site conditions are generally dry-mesic to mesic, nutrient-rich to very rich. As such, these site types are capable of supporting the moisture and nutrient demanding mesic hardwoods (sugar maple, basswood, white ash). The basis for this group is a common presettlement fire regime, which virtually eliminated the fire-sensitive mesic hardwoods from the landscape. Plant associations representing these types are therefore considered phases because these communities are still undergoing floristic change in the fire-free environment.

Principal cover types: White oak and red oak dominate most current stands. American or slippery elm, black cherry, shagbark and bitternut hickory are the most

common associates. Sugar maple, basswood or white ash occur sporadically, but may locally be well represented.

Regeneration: Where seed sources of mesic hardwoods are still lacking the principal species in the sapling layer are elms, black cherry and shagbark hickory. Bitternut hickory and ironwood can also be well represented. Where mesic hardwoods are present, white ash or basswood are generally better represented than is sugar maple.

Growth potential: All species naturally occurring on these types have high growth potential if regeneration requirements are met.

Other management considerations: Because high quality red and white oaks often occur on these types it is assumed, by some, that oak can be maintained by simple one-cut shelterwood method, if not by conserva-

tive "selective" cutting. However, oak stands on these types almost universally lack adequate advance regeneration that could take advantage of openings thus created. To successfully regenerate oak on these sites advance regeneration must first be established, by simultaneously opening the canopy and controlling competing understory vegetation. Once oak seedlings establish adequate root system they can

outgrow competing vegetation if given enough light.

Sometimes too much emphasis is placed on oak regeneration and other potentially valuable species are ignored. White ash, hickories or basswood are often present in the understory and respond well to release. They are also easier to regenerate through shelterwood cutting than are the oaks.

Habitat Type Group 5

(Dry-mesic and mesic sites; Sugar maple-Basswood and Sugar maple-White ash habitat type series): AFRDeO, AFRDe, ATiFrVb, ATiFrCi, ATiFrCa, ATiDe, ATiDe-Ha, ATiDe-As, ATiSa, ATiSa-De, ATiCa, ATiCa-AI, ATiCa-La, ATiH

Site characteristics: These types represent the same landforms and soils as the preceding group, but for various reasons were not subject to frequent fires in presettlement times. Shade tolerant (and fire-sensitive) mesic hardwoods are therefore present in most stands.

Principal cover types: Sugar maple, basswood or white ash are nearly always present but not necessarily dominant. Red and white oak are often well represented, particularly in the largest diameter classes. Bitternut hickory, black cherry, elm and ironwood may also be prominent.

Regeneration: Predominance of sugar maple in the seedling

and sapling layer is almost universal. Other important species in the sapling layer, depending on the habitat type and disturbance history, are basswood, white ash, bitternut hickory, ironwood and American elm. Other, less shade-tolerant species, and particularly the oaks are not significantly represented in the regeneration layer.

Growth potential: All naturally occurring species on these types have high growth potential if regeneration requirements are met.

Other management considerations: While all stands on these habitat types can easily be regenerated by a variety of silvi-

cultural techniques, most partial cutting techniques progressively lead toward dominance of sugar maple. If greater tree species diversity, and subsequently higher

overall biodiversity is desired, a combination of silvicultural techniques, such as shelterwood and group selection, can be applied.

Habitat Type Group 6
(Mesic sites; Sugar maple-
American beech habitat type series):
AFAs, AFAs-O, AFH

Site characteristics: These types occur on calcareous till and lacustrine clays in a narrow zone (3-4 townships wide) in the proximity of Lake Michigan shoreline. This area lies east of the tension zone, which in this region runs north to south. The types are classified as mesic and nutrient-rich to very rich.

Principal cover types: Sugar maple is generally the most dominant species but American beech is also strongly represented. White ash, basswood and red oak are common associates, but white oak is much less frequent than it is on other mesic types in

this region. Black cherry, bitternut hickory and sometimes white pine, are other minor associates.

Regeneration: Sugar maple, beech, white ash, basswood and ironwood comprise the majority in the sapling layer. Oak regeneration is absent.

Growth potential: All naturally occurring species have high growth potential.

Other management considerations: Because in Wisconsin, American beech occurs naturally in a very limited area there are ecological, and possibly economic reasons, to maintain it in managed forests.

Habitat Type Group 7
(Mesic sites; Sugar maple-American beech-
Hemlock habitat type series): AFTD

Site characteristics: No specific site characteristics have been identified for this habitat type, but it is limited to the proximity of

Lake Michigan shoreline (similar to habitat type group 6) and it often occurs on lacustrine sands over clay.

Principal cover types: This type supports distinctly northern mesic forests. Sugar maple and American beech tend to dominate, but presence of hemlock and yellow birch distinguish it from the southern mesic forest. White oak and hickories are generally absent and red maple and white birch are better represented than they are on the southern mesic types.

Regeneration: Sugar maple and beech consistently make up the majority of seedlings and saplings. Hemlock, ironwood and red maple have a constancy of about 50% and yellow birch occurs only sporadically.

Growth potential: All species mentioned above have high growth potential on this type.

Other management considerations: It is not entirely clear how hemlock and yellow birch regenerated historically. Under present conditions neither species regenerates well on thick humus and litter layers that usually develop where beech is well represented. Tip-up mounds of mineral soil created by wind throw have been shown to be favorable sites for establishment of both hemlock and yellow birch. However, such wind throws do not occur frequently enough to maintain appreciable numbers of these species in present forests. Mechanical soil scarification is usually necessary to maintain hemlock and yellow birch in maple-beech dominated forests.

Appendix

Explanation of Tables and Figures in this Section

Table 6.1. Relationships among habitat types, habitat type phases and variants within and among regions. Within a region and moisture group types are arranged from top to bottom in order of increasing soil nutrient status. When comparing types across the regions, those on the same line are most similar to each other. Note that this table simply shows how habitat types are grouped and presented in this field guide. Regional boundaries are set to make the system easier to use. In practice, habitat types described for one region will also be found in portions of adjacent regions.

Table 6.2. Ecological species groups. The concept of ecological species groups is based on observations of co-occurrence of species in similar environments in a particular climatic region. Understory species indicating similar site conditions—for example, moisture, nutrients, acidity, etc. are grouped together, named for a characteristic species of the group, and termed “ecological species groups.”

This table shows four ecological species groups (and three subgroups) representing the moisture gradient from dry to mesic. The table can be used to quickly assign a site to a position on the moisture gradient without the use of specific identification keys. For example, if only members of groups 1 and 2 are present the site is classified as “dry.” A dry-mesic site will likely contain some members of group 2 and some of group 3 (but not many

of group 1). Relative presence of subgroups A, B, and C will further identify the position on the broader dry-mesic portion. Finally, mesic sites will contain some members of group 4 and some of group 3. Relative representation of the three subgroups will again help determine whether the site is strongly mesic, or intermediate between mesic and dry mesic. A good estimate of the potential forest productivity and successional trends of a community (or a site) classified in this way can be gleaned from Figures 6.1, 6.2, and 6.3.

Table 6.3. Alphabetical listing of understory species occurrence across all habitat types. This table offers the quickest reference on the expected occurrence of a specific species on various habitat types.

Table 6.4. Index to abbreviations of habitat type names. This table also shows numbers of reference stands used as a basis for delineation and description of each habitat type.

Figure 6.1. Occurrence of major tree species across habitat types representing the moisture-nutrient gradient. This figure shows average representation for major species only. Note that not all species occur on every habitat type listed under the segments of moisture-nutrient gradient. For region and habitat type specific information see “Occurrence of Tree Species” tables in section 3.

Figure 6.2. Occurrence of tree saplings across habitat types representing the moisture-nutrient gradient.

Note that not all species occur on every habitat type listed under the segments of moisture-nutrient gradient. Because this figure shows the average presence and abundance for all habitat types and all cover types associated with a given moisture-nutrient segment, it is useful primarily to distinguish species with strong and weak potential for natural regeneration, in general. For region and habitat type specific information see "Occurrence of Tree Species" tables in section 3.

Figure 6.3. Relative growth potential of major tree species across the moisture-nutrient gradient. As would be expected, all species grow best on

the richer sites in the absence of competition. However, the less shade tolerant species can be maintained on the richer sites only through management. This probably applies to all species in this figure, with relative tolerance value less than 7. (Relative shade tolerance values are shown at the ends of horizontal bars). The less tolerant species can be managed much more easily on dry-mesic and dry sites. Also note that not all species occur on every habitat type listed under the segments of moisture-nutrient gradient. For region and habitat type specific information see "Occurrence of Tree Species" tables in section 3.

Table 6.1 Relationships among habitat types, habitat type phases and variants within and among regions. Within a region and moisture group, types are arranged from top to bottom in order of increasing soil nutrient status. When comparing types across the regions, those on the same line are most similar to each other.

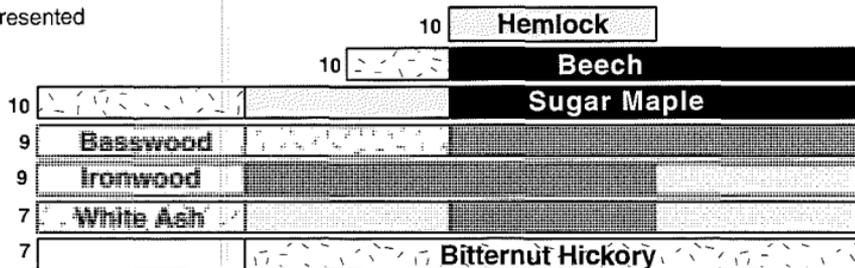
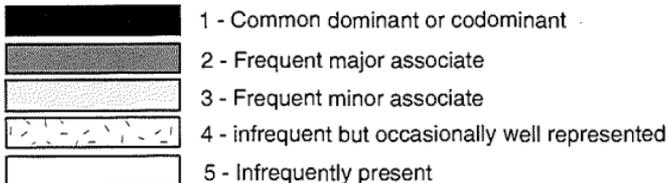
	Region 6	Region 7	Baraboo	Region 8	Region 9	Region 10	Region 11
D R Y	PVGy	PVGy			PEu		
	PVHa						
	PVCr	PVCr			PVG		
D R Y	PVRh	PVRh					
	ArDe-V	ArDe-V	ArDe-V		ArDe		
	ArCi				AQVb-Gr		
	ArCi-Ph	ArCi-Ph					
M E S S I C	AArVb		AArL				
		ATiDe(Pr)	ATiDe-Ha	ATiCr(O)	ATiFrCi	ATiFrVb(Cr)	AFrDe(Vb)
			ATiDe-As	ATiCr(As)		ATiFrVb	AFrDe
		ATiDe					AFrDeO
M E S S I C			ATTr				AFTD
	ATiSa-De	ATiSa		ATiAs(De)		ATiFrCa(O)	
	ATiCa-La	ATiCa	ATiCa-Al	ATiH		ATiFrCa	
							AFH
							AFAs
						AFAs-O	

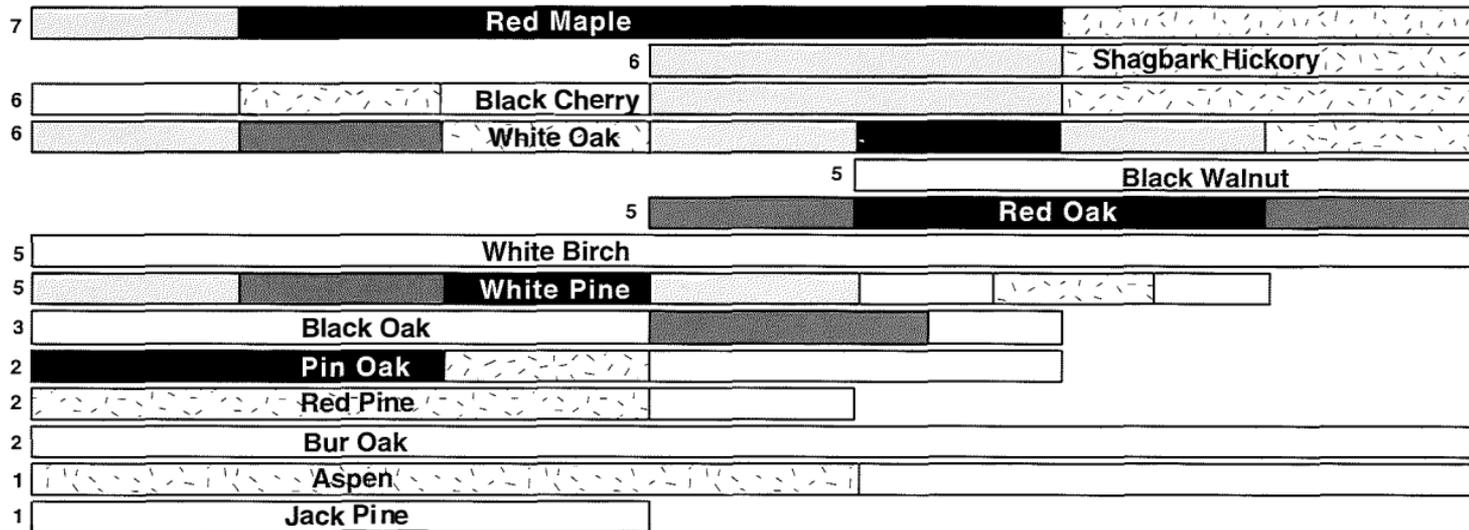
Figure 6.1. Occurrence of tree species across habitat types representing the moisture-nutrient gradient. Categories are based on average representation in reference stands making up the habitat type groups on various segments of the gradient.

The following criteria were used (constancy % / coverage %): 1, 51-100/<16; 2, 25-50/>16; 3, 25-50/5-15; 4, 10-25/>5; 5, <16%. Numbers in front of bars are relative shade tolerance values: 1, least tolerant; 10, most tolerant.

Dry			Dry-Mesic			Mesic		
Poor	Medium		Poor	Medium	Rich	Rich	Very Rich	

PVGy	PVHa	PVCr	PVG	PVRh	ArDe	ArCi-Ph	AARL	ATiDe	ATiAs(De)	ATiCa-Al	ATiCa
	PEu				ArDe-V		ATiDe(Pr)	ATiDe-Ha	AFH	ATiCa-La	ATiH
					AARVb		ATiFrCi	ATiDe-As	AFTD	ATiFrCa	AFAs
					ArCi		ATiFrVb(Cr)	ATiCa-De	ATTr		AFAs-O
					AQVb-Gr		AFrDe(Vb)	ATiSa			
							AFrDe	ATiCr(O)			
								ATiCr(As)			
								ATiFrVb			
								ATiFrCa(O)			
								AFrDeO			





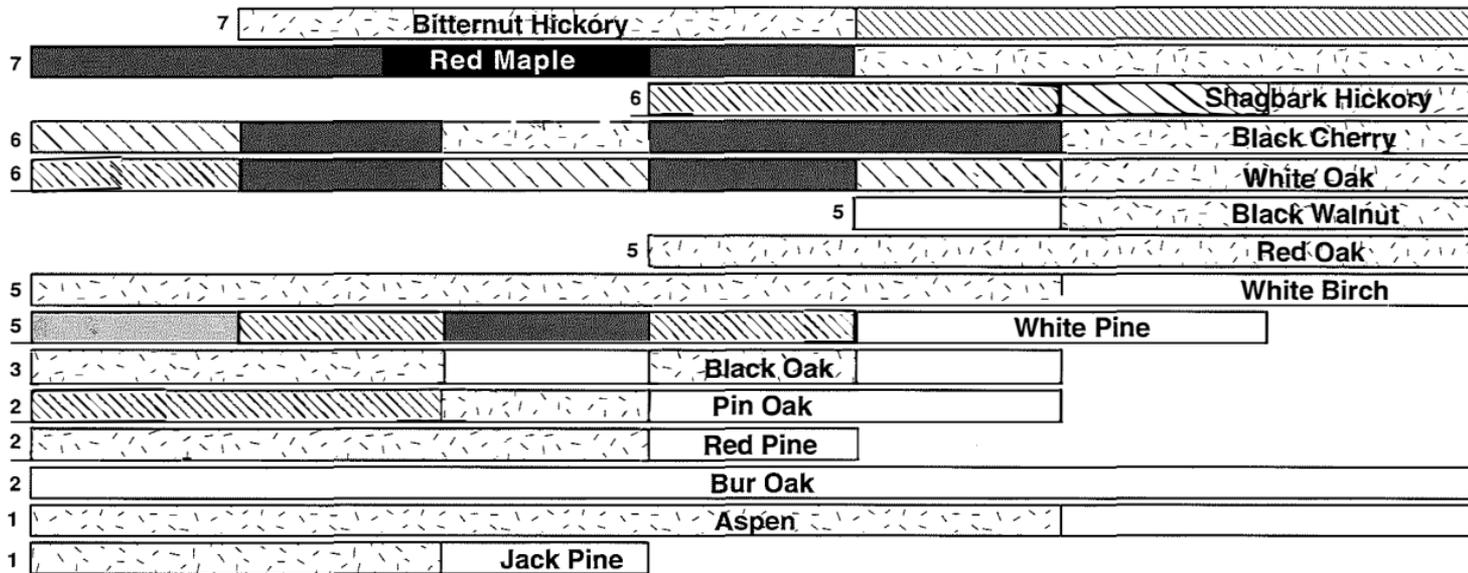
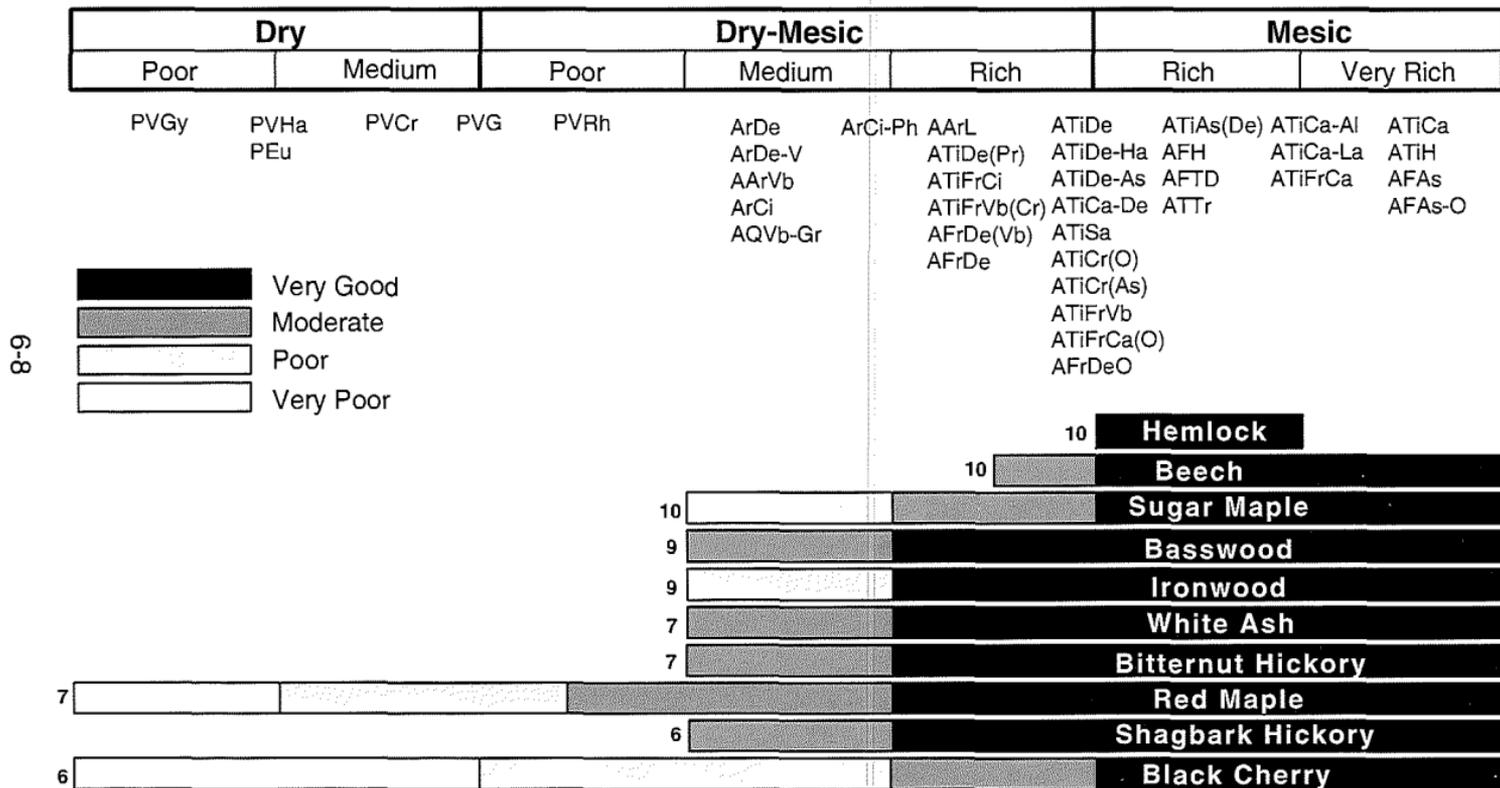
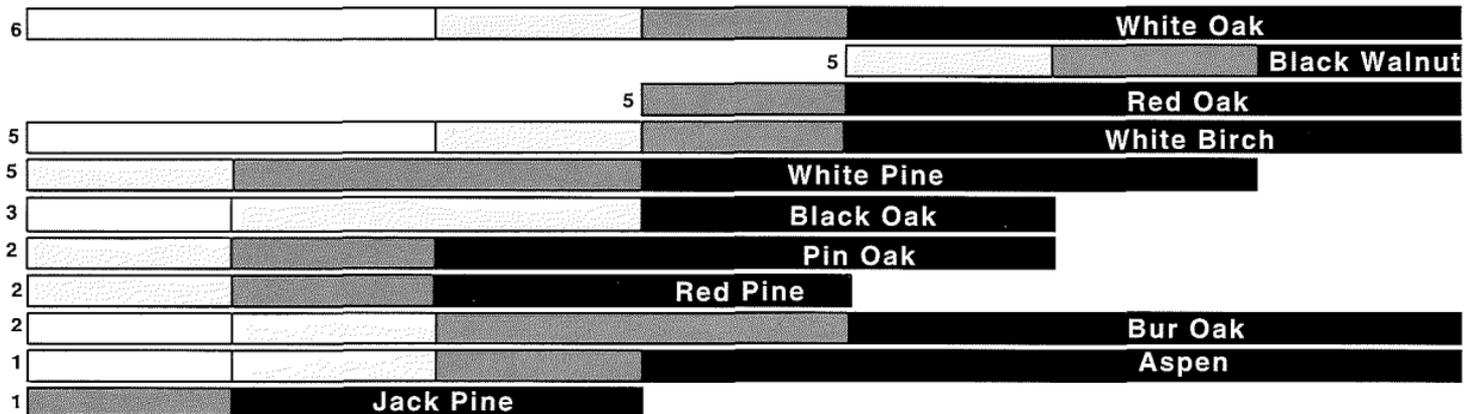


Figure 6.3. Relative growth potential of major tree species across the moisture-nutrient gradient.

Numbers in front of bars are relative shade tolerance values: 1, least tolerant; 10, most tolerant.





Synopsis of Ecological and Silvicultural Characteristics of Selected Tree Species

This section is intended for non-professional users, or anyone not familiar with the Lake States forests.

The pattern of the distribution of tree species along a range of environments, their growth rates and their role in forest community development are largely a function of their ecological properties (e.g. requirements for moisture, nutrients and light, their rooting habits, seed production, dissemination and germination, etc.). Detailed knowledge of such properties for individual species is growing, but is still fragmented and far from complete. What we refer to as silvicultural characteristics is nothing more than those ecological properties that we understand well enough to consider them when we manipulate forest vegetation (application of silviculture).

The following brief descriptions attempt to characterize individual species only in terms of their most conspicuous ecological behavior under Wisconsin conditions. Knowledge of special values of each species to humans and to other organisms is, of course, also required for management, but such information is too extensive for inclusion in this guide, and can be found in many other sources.

White Ash

Together with basswood, white ash is the most common associate of sugar maple dominated communities. It has high requirements for soil moisture and nutrients. On optimal sites it is among the fastest growing hardwoods and it consistently produces

straight, branch-free stems. The root system is not deep, but wide-spreading and fibrous.

White ash is moderately shade tolerant, especially when in seedling and sapling stages. However, abundant reproduction is generally found only in canopy gaps. In natural stands white ash seldom represents more than ten percent of total composition. However, shelterwood or group-selection cutting systems can increase its representation. Because of thin bark and superficial root system white ash is easily damaged by fire.

Trembling (Quaking) Aspen

Aspen has the widest range of distribution of all North American trees. Although ubiquitous in Wisconsin it is far more characteristic of northern than southern forest region. Its most notable ecological characteristic is the ability to rapidly invade cut-over and burned-over areas. It establishes on all types of soils except the driest sands and stagnant swamps. However, its perpetuation depends entirely on recurrence of disturbance. Because of its extreme intolerance to shade it is readily replaced by many tree species in the absence of disturbance. Once in place, aspen reproduces almost entirely by sprouting from extensive superficial root systems (root suckering). Although sprouts several feet tall are found in almost every stand where aspen is present, they seldom grow to tree size unless the canopy is opened by cutting or natural disturbance. Because most tree species that succeed aspen have greater longevity, and aspen's

sprouting ability declines with age, aspen tends to drop out of the stand after only one generation. However, enough scattered individual trees, or small clones, generally remain on the landscape to supply seed for colonizing newly disturbed sites. Because aspen is very susceptible to fire it was not very abundant in southern Wisconsin in presettlement time.

Largetooth (Big-tooth) Aspen

This species is similar to trembling aspen, except for larger, coarsely-toothed leaves and distinct yellowish-brown bark. It also grows to a somewhat larger size. It has somewhat greater drought tolerance than trembling aspen and is better represented of the two species in southern Wisconsin.

Basswood

This is a large tree with a fairly straight trunk, heavy symmetrical crown, and extensive, fibrous root system. Together with white ash it is the principal associate of sugar maple on the mesic, nutrient rich sites, both in northern and southern forests. However, it seldom represents more than 10-20 percent of total composition. It reproduces readily by stump sprouting, resulting in high proportion of multiple stemmed trees in many stands. Reproduction from seed is limited, but reasons for this are not fully known. Basswood foliage is exceptionally high in mineral nutrients making this species one of the best soil improvers.

American Beech

Beech occurs throughout the eastern deciduous forest region of the United States and it reaches its western limit of distribution in eastern Wisconsin

and Upper Michigan. In southern Wisconsin it is confined to Habitat Type Region 11.

Together with sugar maple it ranks as the most shade tolerant hardwood in Wisconsin. It most commonly occurs in association with sugar maple, hemlock and yellow birch. Its moisture and nutrient requirements appear also to be similar to those of sugar maple although its limited western distribution suggests that it may require somewhat moister climate.

Beech periodically produces heavy seed crop, but because seed is heavily utilized by many animals (e.g. black bear, birds, rodents, weevils) beech reproduction is generally not as abundant as that of sugar maple. However, its persistence in the community is enhanced by its ability to reproduce by stump sprouting and by root suckers. It is well adapted for management by shelterwood systems. Historically, beech occurrence in southern Wisconsin might also have been limited by fires because the thin bark and surface root systems make beech highly susceptible to fire damage.

Paper Birch

Next to aspen, paper birch is the most notable pioneer tree species throughout the boreal, and the cooler parts of temperate regions. It propagates chiefly by seed which is carried great distances by wind. It is highly light demanding but somewhat less drought tolerant than aspen. It develops best on mesic sandy loams with moderate nutrient levels. It also occurs on wet soils, bogs and rock outcrops, but in these environments it deteriorates at an early age. Near its warm limit of distribution, which includes southern Wisconsin, it is

most often confined to cooler slopes. Although intolerant of shade, birch seedlings sometimes survive in canopy gaps and unlike aspen, scattered birch trees are rather common across the landscape.

Yellow Birch

This birch differs significantly from all other members of the birch family in both, ecological characteristics, and wood properties. All other species of birch are aggressive pioneers while yellow birch is an important member of mature communities of sugar maple, hemlock and beech on moist but only moderately fertile sites. It does especially well on soils influenced by seepage, but not on poorly drained muck or peat.

Yellow birch is moderately shade tolerant, but its regeneration requirements are not completely understood. Partial cuttings have yielded good results in numerous trials. As a "faithful companion" of hemlock and sugar maple, yellow birch is primarily a tree of the north. In southern Wisconsin it occurs only sporadically.

Eastern Redcedar

Eastern redcedar is the most widely distributed conifer of tree size in the Eastern United States, but in Wisconsin it occurs only in the approximately southern half of the state. It grows on a wide variety of soils, from dry rock outcrops to swampy land. In Wisconsin, it is most abundant on dry, exposed sites and abandoned fields. Particularly conspicuous are the so called cedar glades, characterized by thin rocky soils and intermittent rock outcrops. These are most common in the "driftless region".

Eastern redcedar is among the first to invade abandoned fields and areas cleared for pasture. Its presence is almost a sure indicator of grazed land. Fruit is a berry-like cone, eaten by many species of wildlife and seed dissemination by animals is probably the primary cause of rapid expansion of the species into abandoned farmland. Although it is considered intolerant of shade it readily invades oak woodlands on drier sites and responds well when openings in the canopy occur. However, on more productive sites redcedar is eventually replaced by various hardwood species.

Black Cherry

Black cherry is an important wildlife tree and is highly valued for its wood. For best development, it requires cool and moist summer growing conditions. In Wisconsin, these conditions are generally not met. Nevertheless, black cherry is found in Wisconsin across the entire moisture-nutrient gradient, but its importance and ecological role varies greatly. Because the seed is distributed primarily by birds and mammals, black cherry seedlings can be found in almost every stand. However, black cherry is very intolerant of shade and further growth is possible only if canopy openings occur. On mesic sites where growth potential is best, tolerant species generally outcompete black cherry saplings and mature, well developed trees are found only sporadically. On dry-mesic and dry sites, generally dominated by oaks and pines, light conditions are somewhat better and black cherry seedlings and saplings are often numerous. However, on

such sites black cherry does not reach large size and on the driest habitat types it may not advance past the sapling size. On the other hand, when stands are opened up to encourage oak regeneration these cherry saplings present strong competition to oak.

American Elm

This is a tall beautiful tree with symmetrical crown, curved branches and extensive fibrous root system. It is perhaps better known as a shade tree in cities and parks than as a typical forest tree. However, before its numbers were severely reduced by the introduced Dutch elm disease, American elm was a common member of many forest types. It has a very wide ecological amplitude, but for optimal growth it requires ample moisture and nutrients. Today it occurs for the most part only as a minor component of the tree stratum, but its light seed and moderate shade tolerance make it a very successful invader in many stands. Together with black cherry, ironwood and red maple it is one of the principal understory competitors in many oak forests, especially where sugar maple and its mesic associates, white ash and basswood, are absent. Its close relative, *slippery* or *red elm*, often plays this role on drier sites.

Eastern Hemlock

Hemlock is a tree of moist and moderately cold climate. In Wisconsin it is largely limited to the northern half of the State. It reaches its western limits of geographic distribution in Douglas and Washburn counties. In the southern half of the state it is restricted to the proximity of Lake Michigan, primarily north of Sheboygan. It also occurs in a few isolated locations in

the Baraboo range and along the Wisconsin River.

It is one of the most shade tolerant of the eastern conifers and it commonly occurs in association with tolerant hardwoods such as sugar maple, yellow birch and American beech. It requires ample moisture, but only moderate levels of mineral nutrients. Therefore it is most often found on relatively coarse soils but in cooler, moister topographic positions such as ravines and north facing slopes. It tolerates extreme acidity and in pure stands promotes accumulation of acid raw humus, which in turn impedes regeneration of many species. For successful natural reproduction, hemlock requires protection of the canopy and is most successfully regenerated by partial cutting. There is also some evidence that successful regeneration depends on reasonably low deer populations.

Bitternut Hickory

Bitternut is most easily distinguished from its closest Wisconsin relative, the shagbark hickory, by its smooth rather than "shaggy" bark. Its range also extends considerably further north and north-west than does shagbark's. Throughout its wide geographic range it occurs on a great variety of soils, but in Wisconsin it shows strong preference for mesic, moderate to rich sites. In most silvicultural literature bitternut is characterized as intolerant of shade. This designation, however, is somewhat misleading in view of the successional strategy of this species. Although bitternut seedlings do not grow much in height under low light conditions they have a tendency to persist. Because of great resprouting ability seedlings can survive browsing,

breakage, drought and fire. Top die-back and resprouting can occur repeatedly with each successive shoot attaining a larger size and developing a stronger root system than its predecessors. In this way advance reproduction often accumulates and responds well to crown openings caused by natural disturbance or silvicultural treatments. This reproduction strategy probably accounts for rather wide distribution, but low densities of bitternut in Wisconsin. Seed dissemination is almost entirely by gravity; the fruit is thought to be generally distasteful to wildlife.

Shagbark Hickory

Shagbark is one of the two Wisconsin's native hickories (bitternut hickory is the other), and it occurs only in the southern part of the State. Throughout the Eastern United States it is a common associate of oak dominated forests. It is medium light demanding, but tolerates considerable shading when young. It also has high sprouting ability. While it has a relatively high requirement for mineral nutrients it is very drought resistant. The combination of these traits make it a successful invader of exposed south slopes and abandoned pastures, as well as persistent member of forest communities where oaks are not regenerating. The great resistance of hickory against uprooting or breakage by wind make this tree a highly valuable stabilizer of forest stands, especially farm woodlots.

Ironwood

(Eastern Hophornbeam)

Ironwood is found throughout the eastern deciduous forest region and therefore occupies a wide range of niches. In Wisconsin it is largely

restricted to mesic and dry-mesic, nutrient-rich sites and is most commonly associated with other typical mesic hardwoods such as sugar maple, basswood, white ash and beech. It is highly shade tolerant and advance reproduction is almost always present. In southern Wisconsin it is often the primary invader of oak communities where sapling competition presents problems in oak regeneration attempts. Because of its relatively small size and extremely hard wood it has historically been considered an undesirable species. In management considerations, more interest has been given to eradicating it than to improving its growth. However, it has considerable wildlife value, and an important role in nutrient cycling.

Red Maple

This is generally a medium-sized tree that grows rapidly, but is relatively short-lived. It has an unusually wide range in regard to light, temperature, nutrient and moisture requirements. It is found on gravely and sandy soils as well as on loams and soils influenced by ground water. It occurs as an incidental associate in many types of mature communities, but also acts as a pioneer on cut-over and burned-over areas, and it readily invades other types of pioneer communities, such as aspen, pines and oaks. However, red maple does not compete well with sugar maple on mesic, nutrient-rich habitat types.

Red maple was apparently not an important component of Wisconsin's forests in pre-settlement time. However, in today's fire-free environment it appears to be the most successful invader on sites where sugar maple is limited.

Although economically less desirable than oaks or pines, red maple serves an important ecological role particularly on less fertile soils. It is more efficient than are pines or oaks in extracting mineral nutrients from the soil and its readily decomposable leaf litter contributes significantly toward improvement of soil fertility. These important functions should be considered by resource managers.

Sugar Maple

This is ecologically and economically one of the most important tree species in Wisconsin. Although it is most common in the northern part of the state, its significance in southern Wisconsin has been increasing ever since wild fires have been brought under control following the American-European settlement. It is found predominantly on deep, well-drained soils rich in mineral nutrients. On sandy soils, or other soils deficient in nutrients, it deteriorates at an early age regardless of the supply of available moisture. It is sensitive to impeded aeration of soil and is never found on organic soils.

Sugar maple has a very high capacity for natural reproduction by either seed or sprouts. Because it is also the most shade tolerant hardwood it is capable of replacing any other species in a successional process. Because sugar maple produces litter rich in nutrients it is considered one of the best soil-conserving or soil-improving trees, enabling other species to attain their best development.

Black Oak

This is one of the most common oaks in southern Wisconsin, but in most respects it is considered inferior to red

and white oak. It is highly drought tolerant and light demanding. It is largely confined to loamy and sandy soils of the forest-prairie transition zones. However, black oak is important as a pioneer on burned-over and sandy soils, where it prevents wind erosion and enriches the soil in organic matter. It is also a source of food for many species of wildlife.

Bur Oak

Bur oak is one of the most drought resistant of the North American oaks. Its range extends furthest west and north-west of any eastern oak species. In Wisconsin bur oak is found across the full range of sites. On deep silt loams it attains very large size but it also occurs as "scrub oak" on the driest sands. In pre-settlement time it was best represented in the transition zone between the prairie and the forest. It was also the principal tree of "oak savanna and oak openings". Historically it was maintained on the landscape by frequent fires which eliminated or reduced the shade tolerant, but fire sensitive species such as sugar maple, white ash and basswood. In absence of disturbance bur oak is being replaced by various species depending on the site and seed source. On mesic sites white ash, basswood and sugar maple are the ultimate invaders. On dry and dry-mesic sites a large number of species are capable of replacing bur oak. Most common are white and black oak, hickories, elms, ironwood and black cherry. In today's stands bur oak is most frequently found as scattered individuals of open-grown, limby form surrounded by any of the species listed above.

Northern Pin Oak

This species, also known as Hills oak or simply "scrub oak" is generally a small tree or a shrub, occurring on some of the driest and nutrient poor sites. It is highly intolerant of shade, but has strong resprouting ability and is thus one of the best adapted species to fire regime. In the absence of fire it can be replaced by many species, (e.g. red maple, white pine, white oak), but on the driest sites it is able to persist, because on these sites potential competitors simply do not meet their growth requirements. Pin oak readily hybridizes with black and red oaks and identification is often difficult. Although pin oak has traditionally been discriminated against in favor of pines, it is an important soil improver and is valuable to wildlife. For these and other reasons it deserves to be considered in management planning.

Northern Red Oak

Next to black walnut, red oak is currently the most economically valuable tree species in the Lake States. Its botanical range is similar to that of white oak, although in Wisconsin it extends throughout the State and into Upper Michigan and Ontario. It has many characteristics of a northern species, such as frost resistance and tolerance of acidic soils. On optimal sites it is the fastest growing oak. It reaches its best development on relatively moist and rich soils, but it also performs well on dry-mesic, medium nutrient sites. In northern Wisconsin and Upper Michigan it also occurs in "scrub" form on the driest sandy soils commonly in mixtures with jack pine, red pine and red maple. However, in southern Wiscon-

sin such sites are most often occupied by white, black, or pin oak, and red oak is generally absent.

Although red oak is considered to be moderately shade tolerant (but less so than white oak), it does not regenerate well on mesic and dry-mesic sites. Shelterwood system of management is often suggested, but experience shows that some form of understory competition control is also necessary until oak seedlings are well established.

White Oak

White oak is one of the most important and impressive of all the numerous oak species of America. Its botanical range covers almost the entire U.S. east of the Mississippi, but in Wisconsin it occurs only in approximately the southern two thirds of the State.

For optimal development it requires high moisture and nutrient conditions, but it also occurs in stunted or even "scrub" form on some of the poorest sandy soils. Although only moderately shade tolerant it is the most tolerant oak in Wisconsin. On dry and some dry-mesic habitat types it reproduces adequately to remain a component throughout the successional process, but on optimal sites its reproduction is nil in undisturbed stands. In presettlement time oaks were able to persist on rich sites because frequent ground fires kept the understory free of competition. This was so because all tolerant mesic hardwoods are fire sensitive, while oak seedlings and saplings repeatedly resprout when the tops are killed by fire. Most of the present oak forests are succeeding to other species unless they are managed in a

way to assure oak regeneration. Any management attempt to regenerate oak species on optimal sites must include adequate canopy openings and control of understory competition.

Jack Pine

Of the three native Wisconsin pines jack pine has the widest geographic distribution. It is primarily a northern species and in southern Wisconsin seldom approaches its growth potential. Everywhere it occurs it is a pronounced pioneer, highly light demanding and resistant to drought and frost. It has low requirements for organic matter and nutrients. It grows reasonably well on coarse sands and rocky ridges, and very well on sandy loams of glacial outwashes. Jack pine also occurs on wet sites including bogs, but under these conditions it exhibits poor growth and short longevity.

Jack pine is a prolific producer of seed and often invades cut-over areas. Forest fires speed natural regeneration by opening cones. Without disturbance jack pine does not regenerate and is easily succeeded by various species of only moderate shade tolerance such as white pine, black cherry, various oaks and many others.

Red Pine

The botanical range of red pine is much smaller than that of jack pine and is centered on the northern Lake States. In terms of light, moisture and nutrient requirements red pine is intermediate between jack and white pines. However, it does not tolerate high water table and poor aeration. In contrast to jack pine, natural red pine regeneration is often found in moderately dense pure or mixed pine

stands, although not to the same extent as is white pine. Red pine has much greater longevity than jack pine and mature trees can survive moderate intensity fires and persist as seed sources for 200 years or more. However, few such trees exist today because of early logging.

Red pine does not naturally occur on the more productive loams and silt loams, because on these soils it is easily outcompeted by numerous hardwood species or by white pine if hardwood seed sources are absent. If planted on such sites, aggressive competition control is required.

White Pine

Historically, white pine has been considered the single most important tree species not only in the Lake States, but throughout the northeastern forest region. There is, however, a misconception held by many, that more or less pure white pine forests covered the region. Such forests did exist in scattered locations, but far more commonly white pine occurred in mixtures with many other species. In contrast to red and jack pines, white pine does occur on richer soils, but only under certain conditions. While it requires higher moisture and nutrient conditions for optimal growth than do red and jack pines it is considerably more shade tolerant and it grows well enough on the poorer sites to be capable of attaining climax status in absence of stand-replacing fires. On the moister and richer habitat types it often becomes established following a disturbance and because of its great longevity (sometimes as high as 400 years) and large size, persists through mid-successional stages. Ultimately, however, it is replaced by

shade tolerant hardwoods and sometimes hemlock.

Early logging and accompanying fires greatly reduced white pine seed source in Wisconsin. However, white pine trees are now reaching seed-bearing age in many areas and natural reproduction is occurring in most forest cover types on dry and dry-mesic habitat types.

It is important to note that in southern Wisconsin white pine occurred only in isolated areas in presettlement time, presumably due to frequent fires. However, it appears to be well suited for this region, especially on the sandier soils.

Black Walnut

Black walnut is perhaps the most famous eastern tree for its valuable wood. In Wisconsin, it is found scattered throughout the southern half of the state. While it can be found on almost any soil, it develops to its reputable size and quality only on the richest silt loams, typically in moist ravines and on alluvial flats. On such sites it often occurs in groups, elsewhere it is typically scattered in various mixtures. Walnut litter is injurious to many other plants.

Table 6.2 Ecological species groups useful for classifying sites into three broad categories: dry, dry-mesic, mesic.

Dry	Dry-Mesic	Mesic
Group1 Dry		
Group2 Dry to Dry-Mesic		
	Group 3 (A,B,C) Dry-Mesic to Mesic	
		Group 4 Mesic

Group 1: *Vaccinium angustifolium* group

Vaccinium angustifolium
Gaylussacia baccata
Amorpha canescens
Gaultheria procumbens
Chimaphila umbellata
Euphorbia corollata

Group 2: *Pteridium aquilinum* group

Pteridium aquilinum
Aster macrophyllus
Uvularia sessilifolia
Apocynum androsaemifolium
Lysimachia quadrifolia
Potentilla simplex
Diervilla lonicera
Amelanchier sp.
Cornus racemosa

Group 3:

A. *Desmodium glutinosum* subgroup (Represented stronger on the dry-mesic end)

Desmodium glutinosum
Sanicula marilandica
Amphicarpa bracteata
Parthenocissus quinquefolia
Vitis riparia
Aralia nudicaulis
Viburnum acerifolium

B. *Arisaema atrorubens* subgroup (Represented stronger on the mesic end)

Arisaema atrorubens

Actaea sp.

Adiantum pedatum
Botrychium virginianum
Uvularia grandiflora
Viola pubescens
Cryptotaenia canadensis
Solidago flexicaulis
Sambucus pubens

C. *Osmorhiza claytoni* subgroup (Represented evenly across the gradient)

Osmorhiza claytoni
Circaea quadrisulcata
Phryma leptostachya
Geranium maculatum
Dryopteris spinulosa

Group 4: *Caulophyllum thalictroides* group

Caulophyllum thalictroides
Hydrophyllum virginianum
Hepatica acutiloba
Trillium sp.
Mitella diphylla
Sanguinaria canadensis
Laportea canadensis
Allium tricoccum
Asarum canadense

Table 6.3 Occurrence of Understory Species on Various Habitat Types

Numbers represent frequency of occurrence classes: *, 10-25%; 1, 26-50%; 2, 51-75%; 3, 76-100%. Letters are coverage classes: A<5%; B, 6-15%; C>15%.

Scientific Name	Common Name	Region 6					Region 7				Baraboo			Region 8			Region 9		Region 10			Region 11		
		PVGy	PVCr	ArDe-V	ArCl-Ph	ATISa-De	ATIDe(Pr)	ATISa	AARL	ATIDe-As	ATiCa-AI	ATICr(O)	ATIAS(De)	PEu	ArDe	ATIFrCI	ATIFrVb(Cr)	ATIFrCa(O)	AfrDe(Vb)	AfrDeO	AFH	AFAs-O		
		PVHa	PVRh	ArCl	AARVb	ATiCa-La	ATIDe	ATiCa	ATIDe-Ha	ATTr	ATICr(As)	ATIh	PVG	AQVb-Gr	ATIFrVb	ATIFrCa	AfrDe	AFTD	AFAs					
<i>Acer spicatum</i>	Mountain maple																							
<i>Actaea</i> spp.	Baneberries			1A	1A	1A	1A																	
<i>Adiantum pedatum</i>	Maidenhair fern																							
<i>Agrimonia gryposepala</i>	Agrimony																							
<i>Alliaria officinalis</i>	Garlic mustard																							
<i>Allium tricoccum</i>	Wild leek																							
<i>Amelanchier</i> spp.	Juneberry	3A	3A	3A	3A	3A	2A	2A	*	1A														
<i>Amorpha canescens</i>	Lead plant	*																						
<i>Amphicarpa bracteata</i>	Hog peanut																							
<i>Anemone quinquefolia</i>	Wood anemone	*	*	*	1A	1A	1A	*	2A	1A	1A													
<i>Anemone virginiana</i>	Thimble weed																							
<i>Antennaria neglecta</i>	Field pussytoes	*	*																					
<i>Apocynum androsaemifolium</i>	Spreading dogbane	2A	1A	2A	1A	1A		1A																
<i>Aquilegia canadensis</i>	Wild columbine	*			*	*	*																	
<i>Aralia nudicaulis</i>	Wild sarsaparilla	1A	3A	3A	3A	3A	2A	3A	1A	*														
<i>Aralia racemosa</i>	Spikenard																							
<i>Arisaema atrorubens</i>	Jack-in-the-pulpit																							
<i>Aronia melanocarpa</i>	Black chokeberry	*																						
<i>Asarum canadense</i>	Wild ginger																							
<i>Asclepias</i> spp.	Milkweeds		*																					
<i>Aster macrophyllus</i>	Large-leaved aster	1A	2A	1A	1A	2A	1A	1A	3A	2A	*													
<i>Aster sagittifolius</i>	Arrow-leaved aster	*	*	*	*	*	*	*	*	*	*													
<i>Athyrium filix-femina</i>	Lady fern																							
<i>Botrychium virginianum</i>	Rattlesnake fern																							
<i>Caulophyllum thalictroides</i>	Blue cohosh																							
<i>Ceanothus americanus</i>	New jersey tea																							
<i>Celestrus scandens</i>	Climbing bittersweet																							
<i>Chimaphila umbellata</i>	pipisissewa	*	*																					
<i>Circaea quadrisulcata</i>	Enchanter's nightshade				*	3A	3A	1A	2A	2A														
<i>Cliantonia borealis</i>	Yellow beadlily																							
<i>Comptonia peregrina</i>	Sweetfern	*																						
<i>Conopholis americana</i>	Squawroot																							
<i>Coptis groenlandica</i>	Goldthread																							
<i>Cornus alternifolia</i>	Alternate-leaved dogwood	*	*	*	*	*	1B	3A	2A															
<i>Cornus canadensis</i>	Bunchberry	*																						
<i>Cornus racemosa</i>	Gray dogwood																							
<i>Cornus rugosa</i>	Round-leaved dogwood																							
<i>Cornus</i> spp.	Dogwoods																							
<i>Corylus americana</i>	Hazel-nut	1A	*	2A	*	3B	2A	2A	2A	1A														
<i>Corylus cornuta</i>	Beaked hazelnut	*	1A	1A	*	*	*	*	2A	1A														
<i>Corylus</i> spp.	Hazelnuts																							
<i>Crataegus</i> spp.	Hawthorns	1A	*																					
<i>Cryptotaenia can.</i>	Honewort																							
<i>Cypripedium acaule</i>	Pink lady's slipper																							
<i>Cypripedium calceolus</i>	Yellow lady's slipper																							
<i>Desmodium glutinosum</i>	Pointed-leaved tick trefoil		*																					
<i>Desmodium nudiflorum</i>	Naked-flowered tick trefoil																							
<i>Diervilla lonicera</i>	Bush honeysuckle	1A	2A	1A																				
<i>Dioscorea villosa</i>	Wild yam root																							
<i>Dirca palustris</i>	Leatherwood																							

Table 6.4. Index to Abbreviations of Habitat Type Names and Distribution of Reference Stands

Type abbrev.	Name	# Ref.		
		Region	Stands	Page
AArL	Acer saccharum-Acer rubrum/Lysimachia	B*	33	3-103
AArVb	Acer saccharum-Acer rubrum/Viburnum	6	7	3- 38
AFAs	Acer-Fagus/Arisaema	11	37	3-218
AFAs-O	Acer-Fagus/Arisaema-Osmorhiza variant	11	22	3-218
AFH	Acer-Fagus/Hydrophyllum	11.	15	3-215
AFrDe	Acer-Fraxinus/Desmodium	11	17	3-207
AFrDe(Vb)	Acer-Fraxinus/Desmodium-Viburnum phase	11	14	3-204
AFrDeO	Acer-Fraxinus/Desmodium-Osmorhiza	11	29	3-207
AFTD	Acer-Fagus-Tsuga/Dryopteris	11	12	3-213
AQVb-Gr	Acer-Quercus/Viburnum-Geranium variant	9	12	3-161
ArCi	Acer rubrum/Circaea	6	26	3- 34
ArCi-Ph	Acer rubrum/Circaea-Phryma variant	6,7	46	3- 34
ArDe	Acer rubrum/Desmodium	9	27	3-158
ArDe-V	Acer rubrum/Desmodium-Vaccinium variant	6,7,B	31	3- 31
ATiAs(De)	Acer-Tilia/Arisaema-Desmodium phase	8	26	3-134
ATiCa	Acer-Tilia/Caulophyllum	7	33	3- 78
ATiCa-Al	Acer-Tilia/Caulophyllum-Allium variant	B	24	3-114
ATiCa-La	Acer-Tilia/Caulophyllum-Laportea variant	6	29	3- 40
ATiCr(As)	Acer-Tilia/Cornus-Arisaema phase	8	12	3-128
ATiCr(O)	Acer-Tilia/Cornus-Osmorhiza phase	8	27	3-128
ATiDe	Acer-Tilia/Desmodium	7	27	3- 74
ATiDe(Pr)	Acer-Tilia/Desmodium-Prunus phase	7	11	3- 74
ATiDe-As	Acer-Tilia/Desmodium-Arisaema variant	B	31	3-106
ATiDe-Ha	Acer-Tilia/Desmodium Hamamelis variant	B	26	3-106
ATiFrCa	Acer-Tilia-Fraxinus/Caulophyllum	10	38	3-185
ATiFrCa(O)	Acer-Tilia-Fraxinus/Caulo.-Osmorhiza phase	10	36	3-185
ATiFrCi	Acer-Tilia-Fraxinus/Circaea	9	11	3-164
ATiFrVb	Acer-Tilia-Fraxinus/Viburnum	10	48	3-181
ATiFrVb(Cr)	Acer-Tilia-Fraxinus/Viburnum-Cornus phase	10	29	3-181
ATiH	Acer-Tilia/Hydrophyllum	8	15	3-134
ATiSa	Acer-Tilia/Sanguinaria	7	19	3- 78
ATiSa-De	Acer-Tilia/Sanguinaria-Desmodium variant	6	41	3- 40
ATTr	Acer-Tsuga/Trientalis	B	4	3-111
PEu	Pinus/Euphorbia	9	15	3-153
PVCr	Pinus/Vaccinium-Cornus	6,7	17	3- 27
PVG	Pinus/Vaccinium-Gaultheria	9	30	3-155
PVGy	Pinus/Vaccinium-Gaylussacia	6,7	71	3- 23
PVHa	Pinus/Vaccinium-Hamamelis	6	62	3- 25
PVRh	Pinus/Vaccinium Rubus hispidus	6,7	16	3- 29

B* = Baraboo

References

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- Pfister, R. D. and S. F. Arno. 1980. Classifying forest habitat types based on potential climax vegetation. *Forest Science* 26(1): 52-70.
- Pfister, R., B. L. Kovalchik, S. F. Arno and R. C. Presby. 1977. Forest Habitat Types of Montana. USDA Forest Service Gen. Tech. Report INT-34.
- USDA Forest Service. 1989. Proceedings - Land Classifications Based on Vegetation: Applications for Management. Gen. Tech. Report INT-257.

Plant Identification

This section will assist you with identification of the species used in the habitat type keys and some additional forest plants which are either very common, or might be confused with the key species. However, it is not intended as a complete guide to flora. Consult other references when needed. Species are arranged alphabetically, by scientific name.

Field identification

When faced with an unknown plant, first examine it carefully and note features such as size of the whole plant, color of flower or foliage, hairiness (pubescence), flower and fruit characteristics, shape, arrangement and attachment of leaves. Remember that within any species, some of these features will vary depending on the season, microhabitat, or historic influences (e.g. defoliation, grazing, frost, etc.).

Examine the color plates and line drawings in this section, and when you find one that best matches your specimen, carefully read the description. If no match is found you may have to consult

other sources. Perhaps the easiest to use is Newcomb's Wildflower Guide (referenced below), but note that it does not include ferns. Additional references are listed below.

Useful References for Plant Identification

- Billington, Cecil. 1952. Ferns of Michigan. Cranbrook Institute of Science; Bloomfield Hills, Mich. 240 pp.
- Billington, Cecil. 1949. Shrubs of Michigan. (Same publisher as above). 339 pp.
- Newcomb, Lawrence. 1977. Newcomb's Wildflower Guide. Little, Brown and Co. Boston, Mass. 490 pp.
- Smith, Helen V. 1966. Michigan Wildflowers. Cranbrook Institute of Science; Bloomfield, Mich. 468 pp.
- Voss, Edward G. 1972. Michigan Flora. (Same publisher as above) 488 pp.
- Courtney Booth and James H. Zimmerman. 1972. Wildflowers and Weeds. Van Nostrand Reinhold Co. 144 pp.

Index to Common Names of Understory Species Used in the Keys or Habitat Type Descriptions

Common Name	Scientific Name	Page
Agrimony	<i>Agrimonia gryposepala</i>	
Alternate-leaved dogwood	<i>Cornus alternifolia</i>	7- 27
American fly honeysuckle	<i>Lonicera canadensis</i>	7- 48
Arrow-leaved aster	<i>Aster sagittifolius</i>	
Baneberries	<i>Actaea</i> spp.	7- 7
Beaked hazelnut	<i>Corylus cornuta</i>	7- 30
Bearberry	<i>Arctostaphylos uva-ursi</i>	7- 15
Bittersweet nightshade	<i>Solanum dulcamara</i>	7- 73
Black chokeberry	<i>Aronia melanocarpa</i>	
Black huckleberry	<i>Gaylussacia baccata</i>	7- 39
Black snakeroot	<i>Sanicula marilandica</i>	7- 69
Blackberries/raspberries	<i>Rubus</i> spp.	
Bloodroot	<i>Sanguinaria canadensis</i>	7- 68
Blue cohosh	<i>Caulophyllum thalictroides</i>	7- 21
Braken fern	<i>Pteridium aquilinum</i>	7- 62
Bristly greenbrier	<i>Smilax tamnoides</i>	
Bunchberry	<i>Cornus canadensis</i>	7- 68
Bush honeysuckle	<i>Diervilla lonicera</i>	7- 34
Carrion flower	<i>Smilax herbacea</i>	7- 72
Chokecherry	<i>Prunus virginiana</i>	
Cinnamon fern	<i>Osmunda cinnamomea</i>	7- 55
Cleavers	<i>Galium asprellum</i>	
Common buckthorn	<i>Rhamnus cathartica</i>	7- 63
Common cinquefoil	<i>Potentilla simplex</i>	
Common elder	<i>Sambucus canadensis</i>	7- 67
Downy arrowwood	<i>Viburnum rafinesquianum</i>	7- 87
Downy rattlesnake plantain	<i>Goodyera pubescens</i>	
Downy yellow violet	<i>Viola pubescens</i>	7- 89
Early meadow rue	<i>Thalictrum dioicum</i>	7- 77
Enchanter's nightshade	<i>Circaea quadrisulcata</i>	7- 23
False solomon's seal	<i>Smilacina racemosa</i>	7- 70
Flowering spurge	<i>Euphorbia corollata</i>	7- 36
Goldenrods	<i>Solidago</i> spp.	
Goldthread	<i>Coptis groenlandica</i>	7- 26
Gray dogwood	<i>Cornus racemosa</i>	7- 29
Greek valerian	<i>Polemonium reptans</i>	
Ground-pine	<i>Lycopodium obscurum</i>	7- 49
Hairy solomon's seal	<i>Polygonatum pubescens</i>	7- 60
Hawthorns	<i>Crataegus</i> spp.	
Hazel-nut	<i>Corylus americana</i>	
Hispid buttercup	<i>Ranunculus hispidus</i>	
Hog peanut	<i>Amphicarpa bracteata</i>	7- 11
Honewort	<i>Cryptotaenia canadensis</i>	7- 31
Interrupted fern	<i>Osmunda claytoniana</i>	7- 56
Jack-in-the-pulpit	<i>Arisaema atrorubens</i>	7- 16
Juneberry	<i>Amelanchier</i> spp.	
Lady fern	<i>Athyrium filix-femina</i>	7- 19
Large-flowered bellwort	<i>Uvularia grandiflora</i>	7- 82
Large-leaved aster	<i>Aster macrophyllus</i>	7- 18
Lead plant	<i>Amorpha canescens</i>	7- 10
Lopseed	<i>Phryma leptostachya</i>	7- 58
Low sweet blueberry	<i>Vaccinium angustifolium</i>	7- 84
Maidenhair fern	<i>Adiantum pedatum</i>	7- 8
Maple-leaved viburnum	<i>Viburnum acerifolium</i>	7- 85

Common Name	Scientific Name	Page
Mayapple	<i>Podophyllum peltatum</i>	7- 59
Miterwort	<i>Mitella diphylla</i>	7- 53
Naked-flowered tick trefoil	<i>Desmodium nudiflorum</i>	7- 33
Nannyberry	<i>Viburnum lentago</i>	7- 86
Northern bedstraw	<i>Galium boreale</i>	
Orange-fruited horse gentian	<i>Triosteum aurantiacum</i>	7- 80
Pale vetchling	<i>Lathyrus ochroleucus</i>	
Partridgeberry	<i>Mitchella repens</i>	7- 52
Pipsissewa	<i>Chimaphila umbellata</i>	7- 22
Pointed-leaved tick trefoil	<i>Desmodium glutinosum</i>	7- 32
Poison ivy	<i>Rhus radicans</i>	7- 64
Prickly ash	<i>Xanthoxylum americanum</i>	
Prickly gooseberry	<i>Ribes cynosbati</i>	7- 65
Rattlesnake fern	<i>Botrychium virginianum</i>	7- 20
Riverbank grape	<i>Vitis riparia</i>	7- 90
Roses	<i>Rosa</i> spp.	
Rosey twisted stalk	<i>Streptopus roseus</i>	7- 75
Round-lobed hepatica	<i>Hepatica americana</i>	7- 44
Sessile-leaved bellwort	<i>Uvularia sessilifolia</i>	7- 83
Sharp-lobed hepatica	<i>Hepatica acutiloba</i>	7- 43
Shining bedstraw	<i>Galium concinnum</i>	
Skunk cabbage	<i>Symplocarpus foetidus</i>	7- 76
Smooth yellow violet	<i>Viola pennsylvanica</i>	7- 88
Spikenard	<i>Aralia racemosa</i>	
Spinulose shield fern	<i>Dryopteris spinulosa</i>	7- 35
Spreading dogbane	<i>Apocynum androsaemifolium</i>	7- 12
Star-flowered solomon's seal	<i>Smilacina stellata</i>	7- 71
Starflower	<i>Trientalis borealis</i>	7- 78
Swamp dewberry	<i>Rubus hispidus</i>	7- 66
Sweet cicely	<i>Osmorhiza claytoni</i>	7- 54
Sweet fern	<i>Comptonia peregrina</i>	7- 25
Sweet-scented bedstraw	<i>Galium triflorum</i>	
Tall nettle	<i>Urtica procera</i>	7- 81
Thimble weed	<i>Anemone virginiana</i>	
Trilliums	<i>Trillium</i> spp.	7- 79
Virginia creeper	<i>Parthenocissus quinquefolia</i>	7- 57
Virginia waterleaf	<i>Hydrophyllum virginianum</i>	7- 45
White avens	<i>Geum canadense</i>	7- 41
White lettuce	<i>Prenanthes alba</i>	7- 61
White snakeroot	<i>Eupatorium rugosum</i>	
Whorled loosestrife	<i>Lysimachia quadrifolia</i>	7- 50
Wild columbine	<i>Aquilegia canadensis</i>	7- 13
Wild geranium	<i>Geranium maculatum</i>	7- 40
Wild ginger	<i>Asarum canadense</i>	7- 17
Wild leek	<i>Allium tricoccum</i>	7- 9
Wild lily-of-the-valley	<i>Maianthemum canadense</i>	7- 51
Wild sarsaparilla	<i>Aralia nudicaulis</i>	7- 14
Wild yam root	<i>Dioscorea villosa</i>	
Winterberry	<i>Ilex verticillata</i>	7- 46
Wintergreen	<i>Gaultheria procumbens</i>	7- 38
Witch hazel	<i>Hamamelis virginiana</i>	7- 42
Wood anemone	<i>Anemone quinquefolia</i>	
Wood nettle	<i>Laportea canadensis</i>	7- 47
Wood strawberry	<i>Fragaria vesca</i>	7- 37
Yellow beadlilly	<i>Clintonia borealis</i>	7- 24
Zigzag goldenrod	<i>Solidago flexicaulis</i>	7- 74

Index to Scientific Names of Understory Species Used in the Keys or Habitat Type Descriptions

Scientific Name	Common Name	Page
<i>Actaea</i> spp.	Baneberries	7- 7
<i>Adiantum pedatum</i>	Maidenhair fern	7- 8
<i>Agrimonia gryposepala</i>	Agrimony	
<i>Allium tricoccum</i>	Wild leek	7- 9
<i>Amelanchier</i> spp.	Juneberry	
<i>Amorpha canescens</i>	Lead plant	7-10
<i>Amphicarpa bracteata</i>	Hog peanut	7-11
<i>Anemone quinquefolia</i>	Wood anemone	
<i>Anemone virginiana</i>	Thimble weed	
<i>Apocynum androsaemifolium</i>	Spreading dogbane	7-12
<i>Aquilegia canadensis</i>	Wild columbine	7-13
<i>Aralia nudicaulis</i>	Wild sarsaparilla	7-14
<i>Aralia racemosa</i>	Spikenard	
<i>Arctostaphylos uva-ursi</i>	Bearberry	7-15
<i>Arisaema atrorubens</i>	Jack-in-the-pulpit	7-16
<i>Aronia melanocarpa</i>	Black chokeberry	
<i>Asarum canadense</i>	Wild ginger	7-17
<i>Aster macrophyllus</i>	Large-leaved aster	7-18
<i>Aster sagittifolius</i>	Arrow-leaved aster	
<i>Athyrium filix-femina</i>	Lady fern	7-19
<i>Botrychium virginianum</i>	Rattlesnake fern	7-20
<i>Caulophyllum thalictroides</i>	Blue cohosh	7-21
<i>Chimaphila umbellata</i>	Pipsissewa	7-22
<i>Circaea quadrisulcata</i>	Enchanter's nightshade	7-23
<i>Clintonia borealis</i>	Yellow beadlilly	7-24
<i>Comptonia peregrina</i>	Sweet fern	7-25
<i>Coptis groenlandica</i>	Goldthread	7-26
<i>Cornus alternifolia</i>	Alternate-leaved dogwood	7-27
<i>Cornus canadensis</i>	Bunchberry	7-28
<i>Cornus racemosa</i>	Gray dogwood	7-29
<i>Corylus americana</i>	Hazel-nut	
<i>Corylus cornuta</i>	Beaked hazelnut	7-30
<i>Crataegus</i> spp.	Hawthorns	
<i>Cryptotaenia canadensis</i>	Honewort	7-31
<i>Desmodium glutinosum</i>	Pointed-leaved tick trefoil	7-32
<i>Desmodium nudiflorum</i>	Naked-flowered tick trefoil	7-33
<i>Diervilla lonicera</i>	Bush honeysuckle	7-34
<i>Dioscorea villosa</i>	Wild yam root	
<i>Dryopteris spinulosa</i>	Spinulose shield fern	7-35
<i>Eupatorium rugosum</i>	White snakeroot	
<i>Euphorbia corollata</i>	Flowering spurge	7-36
<i>Fragaria vesca</i>	Wood strawberry	7-37
<i>Galium asprellum</i>	Cleavers	
<i>Galium boreale</i>	Northern bedstraw	
<i>Galium concinnum</i>	Shining bedstraw	
<i>Galium triflorum</i>	Sweet-scented bedstraw	
<i>Gaultheria procumbens</i>	Wintergreen	7-38
<i>Gaylussacia baccata</i>	Black huckleberry	7-39
<i>Geranium maculatum</i>	Wild geranium	7-40
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Hornbeam, American	<i>Carpinus caroliniana</i>
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Oak, White	<i>Quercus alba</i>
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Pine, Red	<i>Pinus resinosa</i>
Pine, White	<i>Pinus strobus</i>
Redcedar, Eastern	<i>Juniperis virginiana</i>
Walnut, Black	<i>Juglans nigra</i>



***Actaea rubra* (Ait.) Willd.**
Red Baneberry

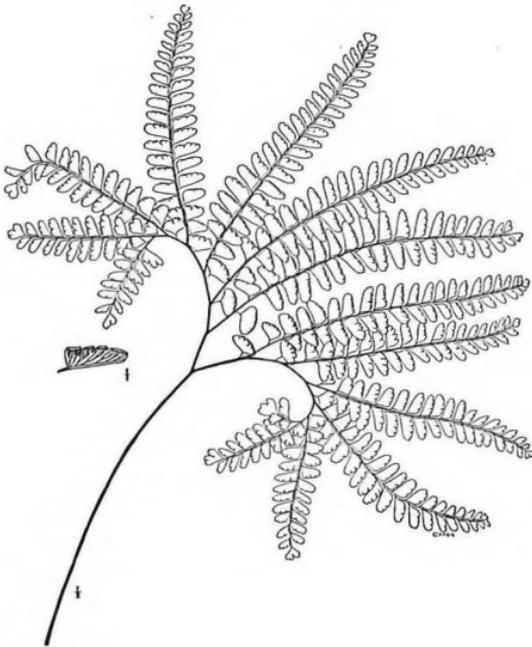
- Berries usually red, but sometimes white.
- Easily confused with a similar species *A. pachypoda*, but the two occur in similar environments and distinction for habitat type classification purposes is not necessary.





Adiantum pedatum L.
Maidenhair Fern

- Most common on mesic and nutrient-rich habitat types

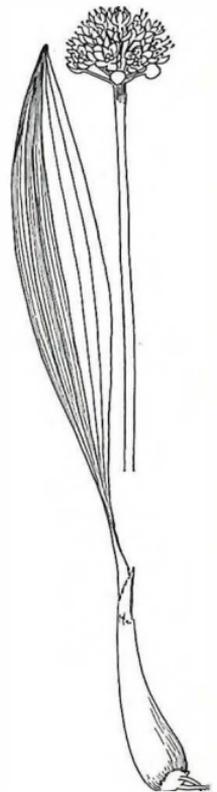


Herb



Allium tricoccum Ait.
Wild Leek

- Leaves die and disappear by mid-June but seed heads remain visible all summer.
- When leaves are crushed they emit a strong onion odor.
- Occurs only on the richest habitat types in all Regions.

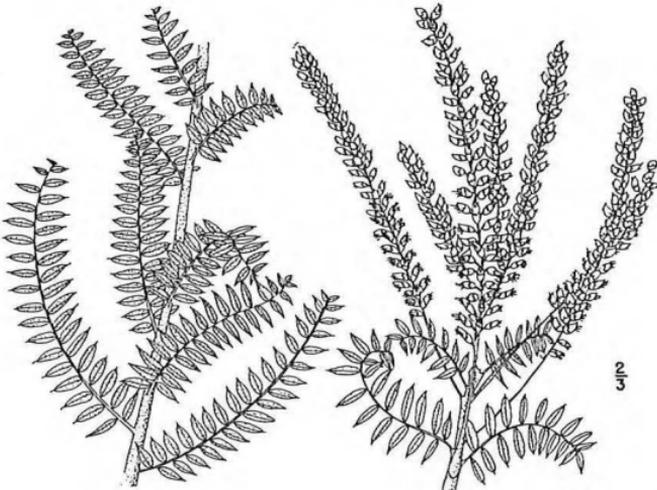


Herb



***Amorpha canescens* Pursh.**
Lead-plant

- An erect shrub up to 3' tall, but often mistaken for an herb.
- Stems and leaves downy-pubescent.
- This is typically a prairie plant, but is also found in some forests in the prairie-forest transition zones.



Shrub



Amphicarpa bracteata (L.) Fern.
Hog-peanut

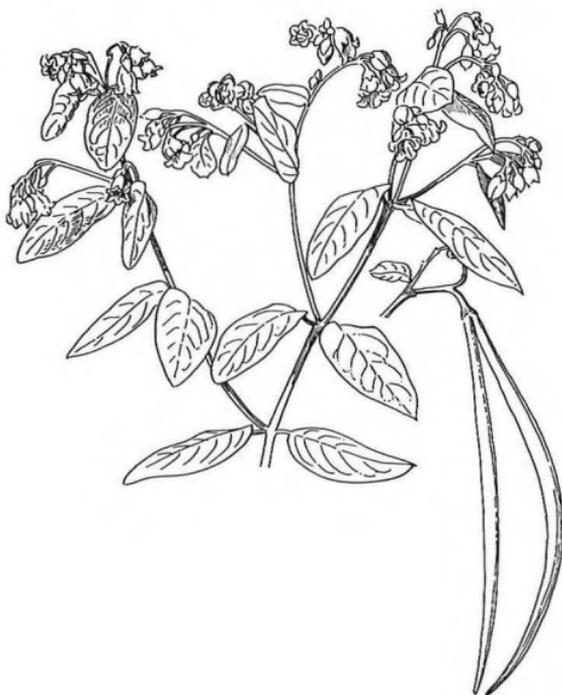


- Low twining or trailing perennial.
- Occurs on many habitat types, but is especially common on dry-mesic ones.



Apocynum androsaemifolium L.
Spreading Dogbane

- Up to 4' tall, often reddish-stemmed perennial.
- Milky juice.
- Best represented on drier habitat types.

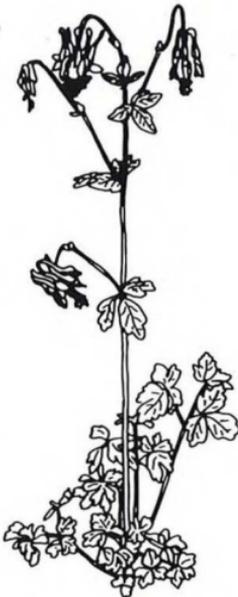


Herb



Aquilegia canadensis L.
Wild Columbine

- Sometimes confused with *Thalictrum dioicum* (early meadowrue) if flowers not present, but *Thalictrum* is found on dry-mesic to mesic habitat types while *Aquilegia* occurs on much drier habitat types.





Aralia nudicaulis L.
Wild Sarsaparilla

- Tall herb, up to 2.5'
- Fruit borne on a single stem from base of plant.

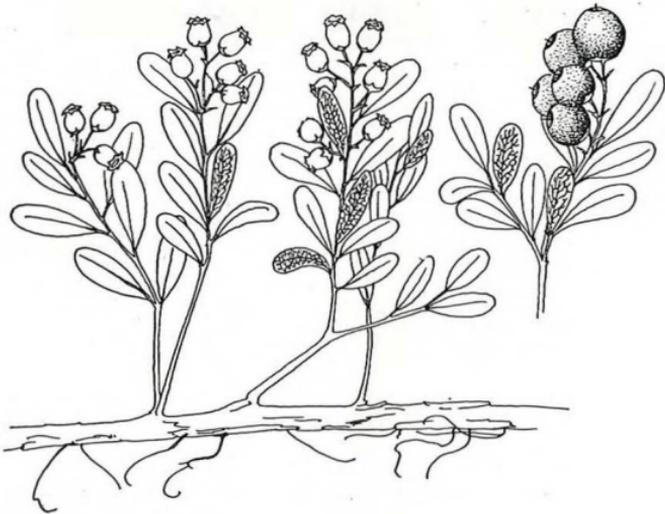


Herb



Arctostaphylos uva-ursi (L.) Spreng.
Bearberry

- Found on very dry habitat types.

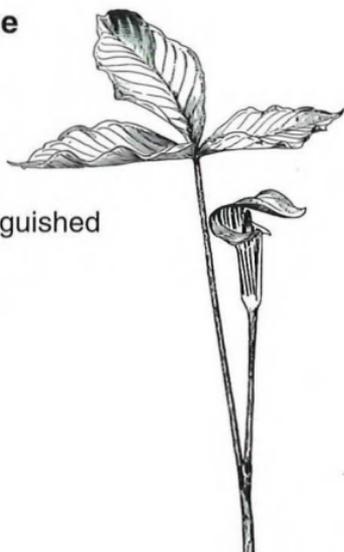


Dwarf shrub



***Arisaema atrorubens* (Ait.) Blume**
Jack-in-the-pulpit

- Flower forms a “pulpit and canopy” appearance.
- Venation joined at leaf margin as distinguished from trillium in which it is not.
- Most common on mesic habitat types.

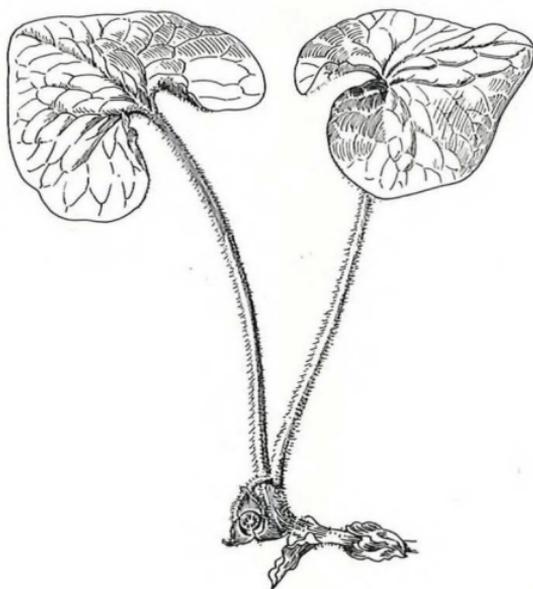


Herb



Asarum canadense L.
Wild Ginger

- Low, creeping, hairy perennial.
- Spicy and aromatic.
- Mesic and rich habitat types.





Aster macrophyllus L.
Large-leaved Aster

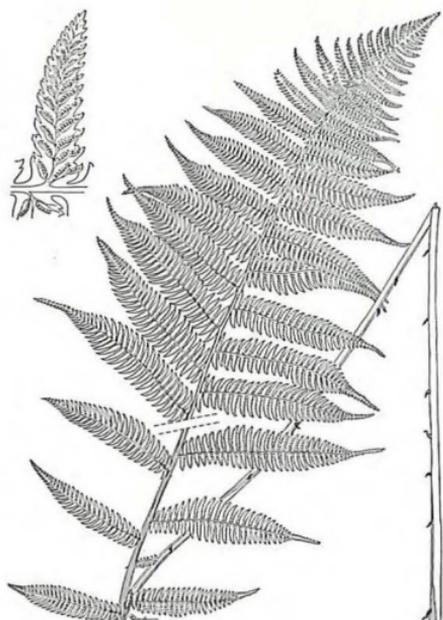
- Only large (thick and rough) basal leaves usually present.
- Often forms large dense patches.
- Flowering stems up to 3' tall, most often not present.



Herb



***Athyrium felix-femina* (L.) Roth**
Lady fern

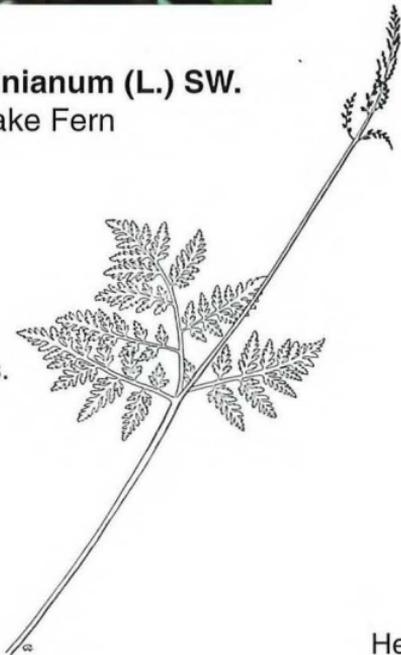


- Has the appearance of spinulose shield fern.
- All fronds (leaves) die in winter, base of fronds scaly or nearly smooth with dark brown or reddish brown scales, as distinguished from spinulose shield fern which has some living fronds throughout the winter and has light brown scales at base of fronds.
- Found on many mesic habitat types.



Botrychium virginianum (L.) SW.
Rattlesnake Fern

- A rather “fleshy” herb.
- The normally conspicuous sporebearing stalk not always present.
- Mesic to dry-mesic habitat types.

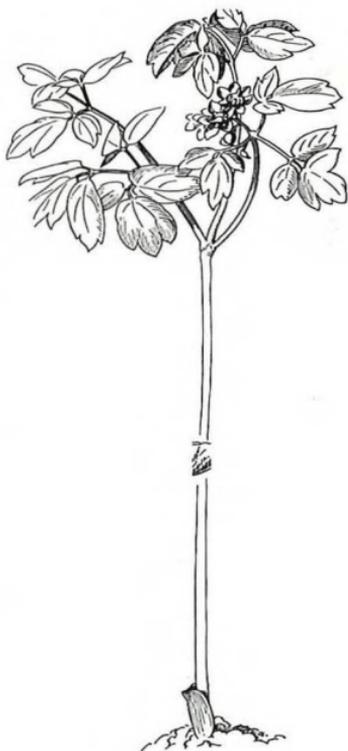


7-20

Herb



***Caulophyllum thalictroides* (L.) Michx.**
Blue Cohosh



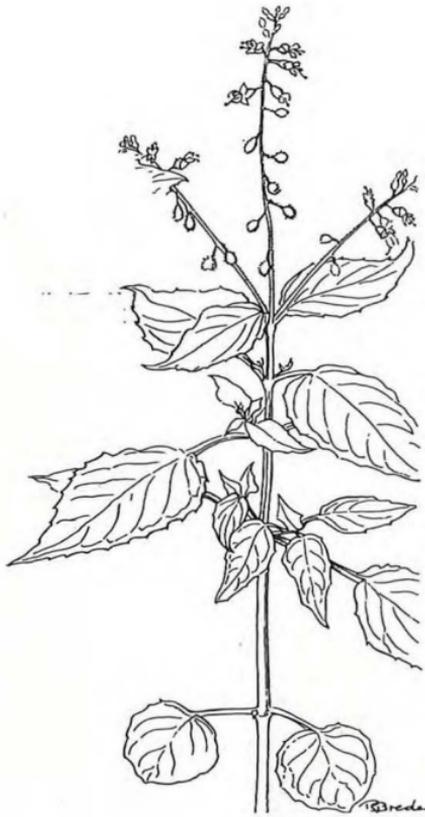
- Tall herb, up to 3'.
- Begins to turn yellow in August, often hard to find in September.
- Indicates very good site.



Chimaphila umbellata (L.) Bart
Prince's Pine (Pipsissewa)

- Leaves shining on upper surface.
- Dry, nutrient-poor habitat types.

Dwarf shrub



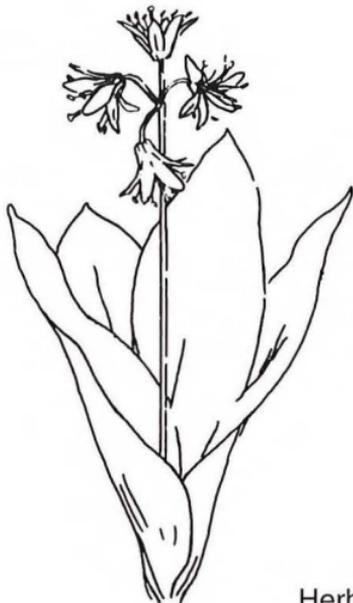
***Circaea quadrisulcata* (Maxim.) Franch. & Sav.**
Enchanter's Nightshade

- 1-2' tall plant. Leaves opposite and shallowly toothed (2-4" long).
- One of the most common plants in southern Wisconsin forests.



Clintonia borealis (A.T.) Raf.
Yellow Beadlily

- Flowers yellow, fruit dark blue.
- Mostly northern,.

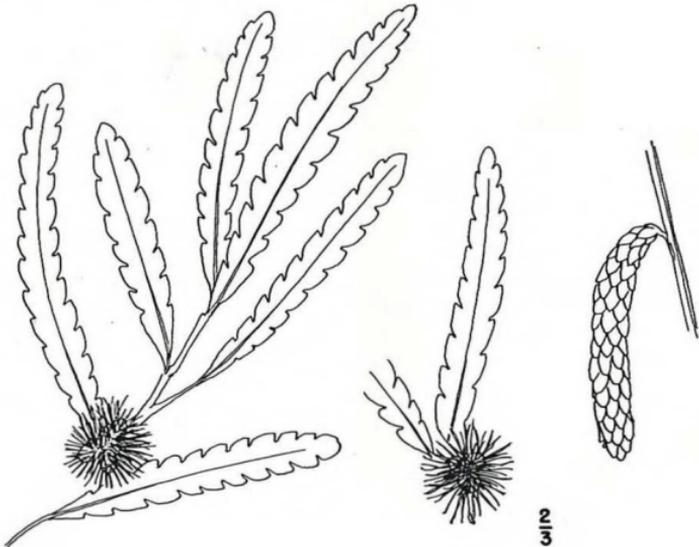


Herb



Comptonia peregrina (L.) Coult.
Sweet-fern

- Aromatic shrub, found almost entirely on the driest, nutrient-poor habitat types.
- Often abundant following a fire.



Shrub



Coptis groenlandica (Oeder) Fern.
Gold Thread



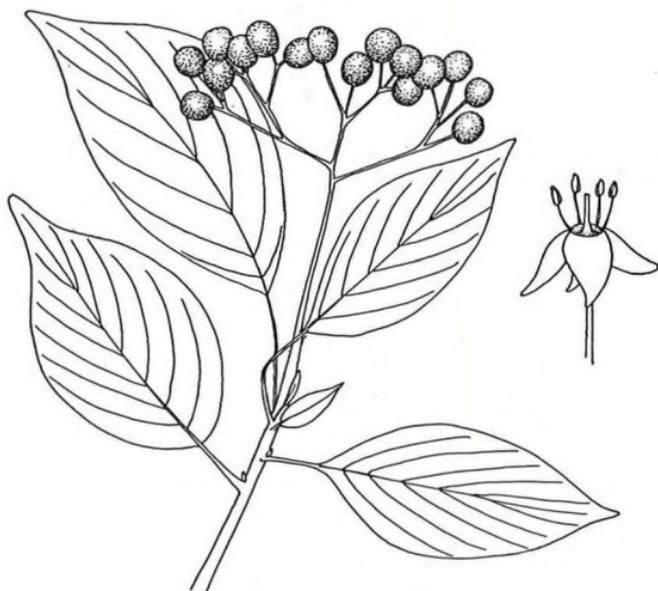
- Has golden yellow threadlike rootstalk.
- Found on somewhat poorly drained soils.

Herb



Cornus alternifolia L.F.
Alternate-leaved Dogwood

- Medium to large shrub (up to 10' tall).
- The only dogwood species with alternate leaves.
- Most common on mesic to dry-mesic habitat types.



Shrub



Cornus canadensis L.
Bunchberry

- Mostly northern
- Most common on poorly drained sites.



Dwarf shrub



Cornus racemosa Lam.
Gray Dogwood

- A shrub up to 7' tall.
- Stems and branches smooth and gray; only flower and fruit stems are bright red.
- Do not confuse with *C. stolonifera* (red-osier dogwood), which has red stems and twigs. Also *C. racemosa* typically occurs on dry sites and *C. stolonifera* on wet.

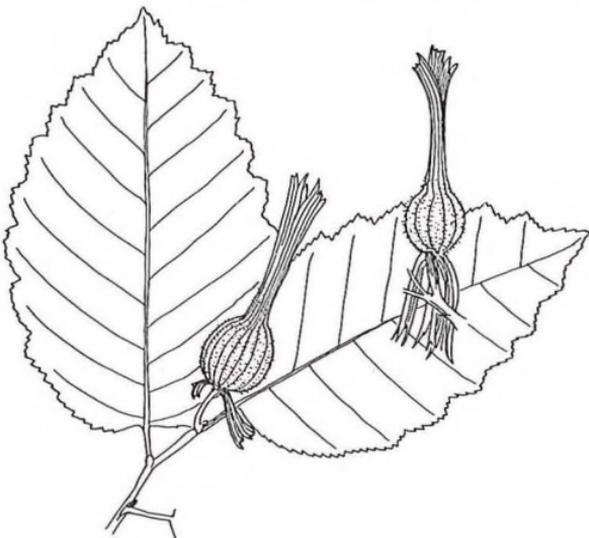


Shrub



***Corylus cornuta* Marsh.**
Hazel (Beaked Hazel)

- Tall shrub up to 15 feet.
- American hazelnut (*C. americana*) is similar, but fruit has no tubular beak as shown on these illustrations.
- Most common on sandy soils, but can be found on all upland soils.



Shrub



***Cryptotaenia canadensis* L. DC.**
Wild Chervil or honewort

- Smooth perennial to 3' tall.
- Best represented on rich, mesic sites.



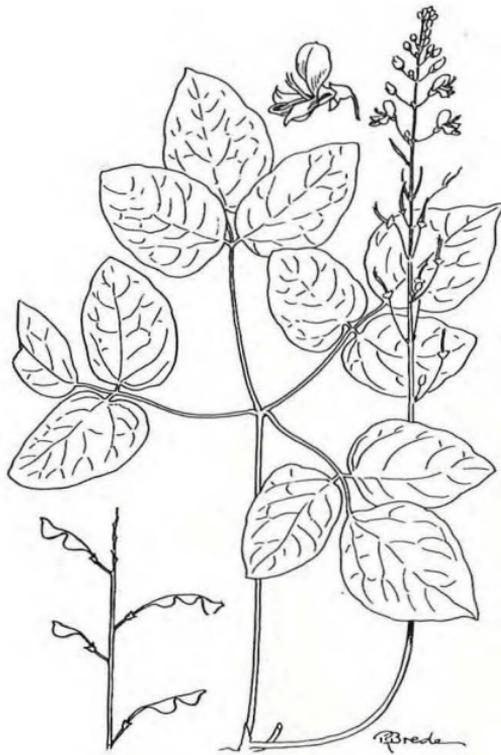
Herb



Desmodium glutinosum (Muhl) Wood
Pointed-leaved Tick Trefoil

- Tall herb, up to 3'.
- Best represented on dry-mesic sites.

Herb



Desmodium Nudiflorum L. DC.
Naked-flowered Tick Trefoil

- A perennial 1-3' tall.
- Forked at the base giving rise to a leafless flowering stem and a leafy stem.
- Best represented on dry-mesic to dry sites.



Diervilla lonicera Mill.
Bush-honeysuckle



- Small shrub, usually less than 3' tall.
- Occurs as single stems or dense bushes.
- Often abundant on dry to dry-mesic habitat types.
- Mostly northern.

Shrub



***Dryopteris spinulosa* (O.F. Mull.) Watt.**
Spinulose Shield Fern

- Scales on base of fronds are light brown as distinguished from lady fern which has dark brown or reddish brown scales.
- Some fronds remain alive during winter—they do not for lady fern.





Euphorbia corollata L.
Flowering Spurge

- Slender perennial (up to 3' tall) with a whorle of leaves near the top.
- Milky and sticky juice.
- Dry habitat types.

Herb



***Fragaria vesca* L.**
Wood strawberry

- Similar to common field or wild strawberry, but leaves with more pronounced veins.





Gaultheria procumbens L.
Wintergreen

- Low-growing evergreen shrub with a wintergreen odor and taste when crushed.
- Characteristic of dry and some wet, nutrient-poor habitat types.
- Mostly northern



Dwarf shrub



Gaylussacia Baccata (Wang.) K.Koch
Black Huckelberry

- A much branched shrub 1-4' tall.
- Fruit resembles common blueberry, but occurs in grape-like bunches.
- Leaves and fruit color are variable.
- Best represented on dry, nutrient-poor sites.



Shrub



Geranium maculatum L.
Wild Geranium



- One of the most common plants in southern Wisconsin's forests.

Herb



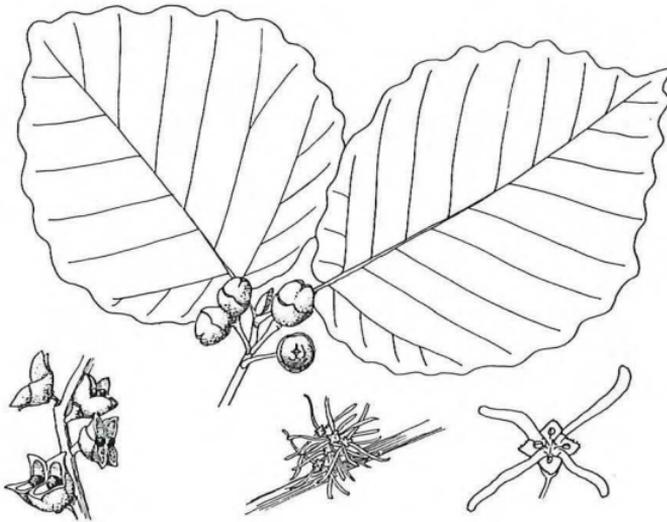
Geum canadense Jacq.
White avens

- A perennial up to 3' tall, arising from a basal rosette.
- Best represented on richer sites.



Hamamelis virginiana L.
Common Witch Hazel

- Tall shrub
- Flowers in the fall, or early winter



Shrub



Hepatica acutiloba D.C.
Sharp-lobed Hepatica

- Similar to *Hepatica americana* (round-lobed hepatica), but the blades of the leaves are usually longer than broad and the 3 divisions are more sharply pointed.
- The two species seldom grow together. *H. acutiloba* occurs on the richest habitat types, while *H. americana* has a wider distribution on poor to medium sites.





***Hepatica americana* (D.C.) Ker.**
Round-lobed Hepatica

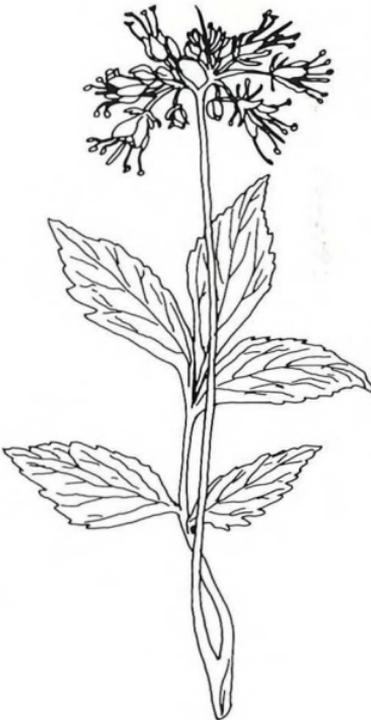
- Leaves usually broader than long, with 3 broad, blunt to rounded lobes.
- Do not confuse with *Hepatica acutiloba*, compare descriptions.



Herb



Hydrophyllum virginianum L.
Virginian Waterleaf

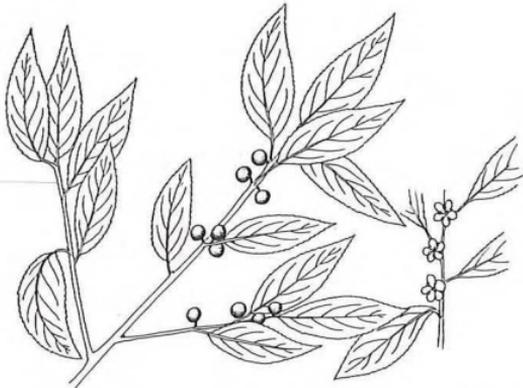


- 1-2' tall herb with rather weak stems.
- Leaves mostly basal, 5-7 lobed, often mottled as though water stained.
- Found primarily on mesic, nutrient-rich habitat types.



***Ilex verticillata* (L.) Gray.**
Winterberry

- A shrub 3-12' tall.
- Bright red berries appear in October and persist into winter.
- Finely toothed (serrate) leaves.
- Most common on wet-mesic sites.



Shrub



Laportea canadensis (L.) Wedd.
Wood Nettle

- The only nettle with alternate leaves.
- Most common on mesic to wet-mesic, nutrient-rich habitat types, especially on silt loams.
- *Boehmeria cylindrica* (false nettle) is similar but has opposite leaves and no stinging hairs. The two species sometimes occur together.





Lonicera canadensis Marsh
American Fly Honeysuckle

- Pubescent under leaves when young, nearly smooth when mature.



Shrub



Lycopodium obscurum L.
Ground-pine



- Main stem creeping horizontally, deep in the soil.
- Aerial stems scattered, erect, tree-like form.
- Mostly northern.

Herb



***Lysimachia quadrifolia* L.**
Whorled Loosestrife

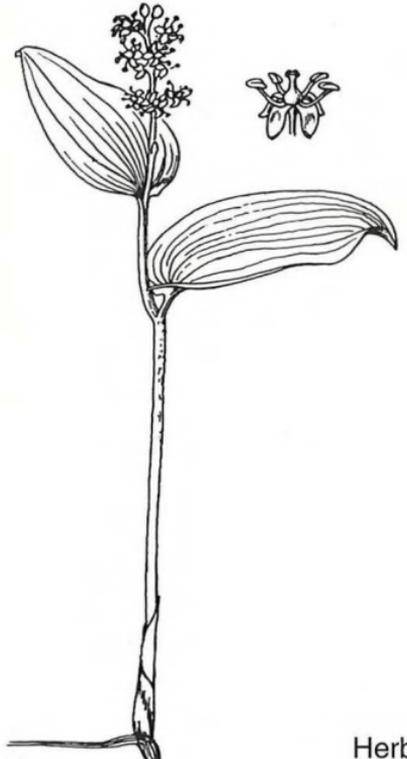
- Found mostly on the driest habitat types.

Herb



Maianthemum canadense Desf.
Wild Lily-of-the-valley

- Single leaf when not fruiting, two leaves when fruiting.
- Mostly northern.



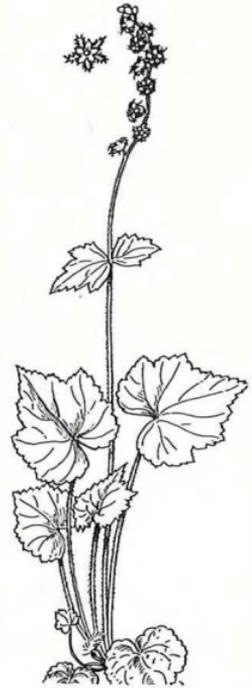


Mitchella repens L.
Partridge-berry

- Small plant; slender paired leaves without serration, whitish along the main veins.
- Mostly northern.



Herb



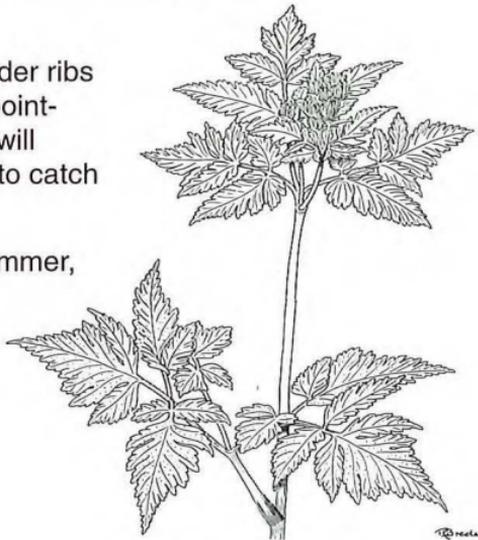
Mitella diphylla L.
Miterwort

- A slender, erect plant (up to 2' tall), with a single pair of opposite leaves at or near the middle of the stem.



Osmorhiza claytoni (Michx.) C.B. Clark
Sweet Cicely

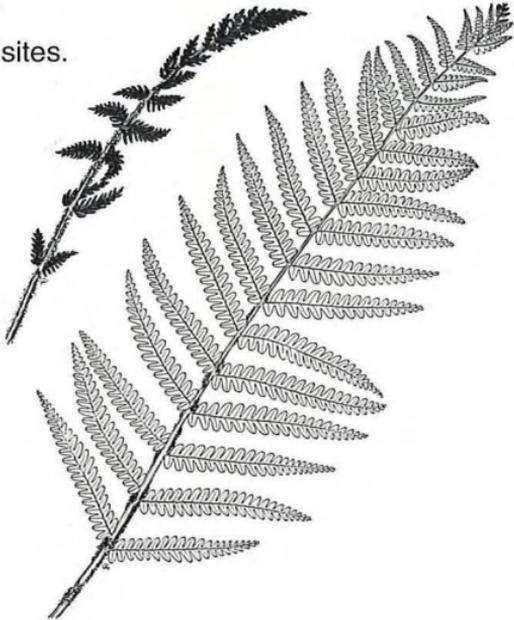
- Can be confused with white baneberry.
- Somewhat pubescent compound (3's to 5's) leaves.
- White flowers in spring.
- Fruit linear, black, with slender ribs covered with stiff, upward-pointing appressed bristles that will cause seed, when mature, to catch on clothing.
- Mature plant dies in late summer, but new basal leaves develop that remain green throughout the winter and spring.





Osmunda cinnamomea L.
Cinnamon fern

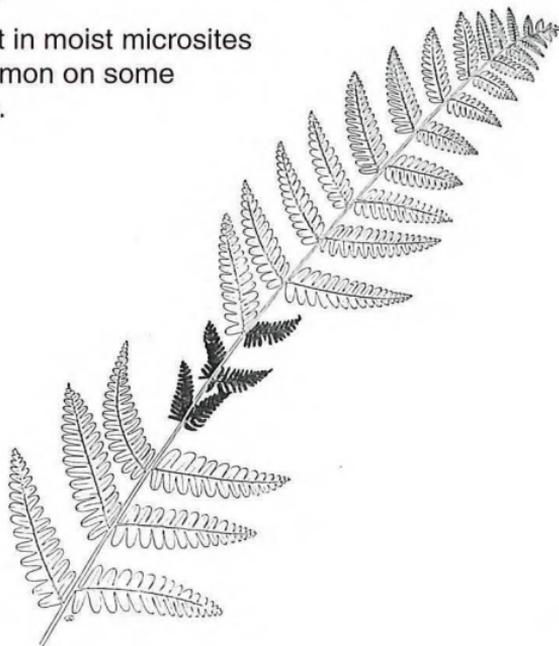
- A large fern (up to 5' tall).
- Similar to interrupted fern but fertile fronds (leaves) occur in the center of a clump.
- Wet-mesic to wet sites.





***Osmunda claytoniana* L.**
Interrupted fern

- A large fern (up to 4' tall).
- The “interrupted” leaf, shown in the drawing, found only on fertile fronds (leaves.)
- Often abundant in moist microsites but is also common on some dry-mesic sites.



Herb



Parthenocissus quinquefolia (L.) Planch.
Virginia Creeper

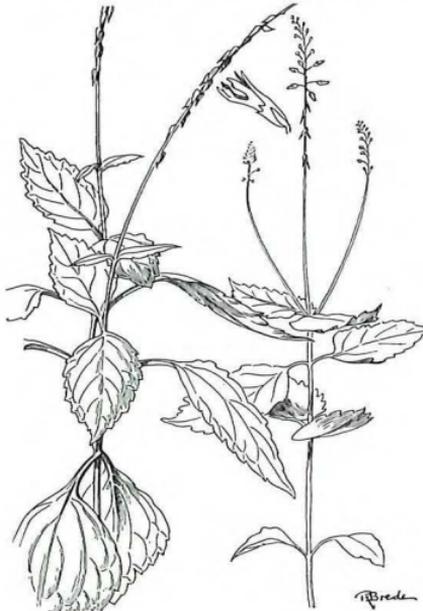
- A trailing or climbing vine. Stem often covered by forest litter and leaves appear to represent single plants.





Phryma leptostachya L.
Lopseed

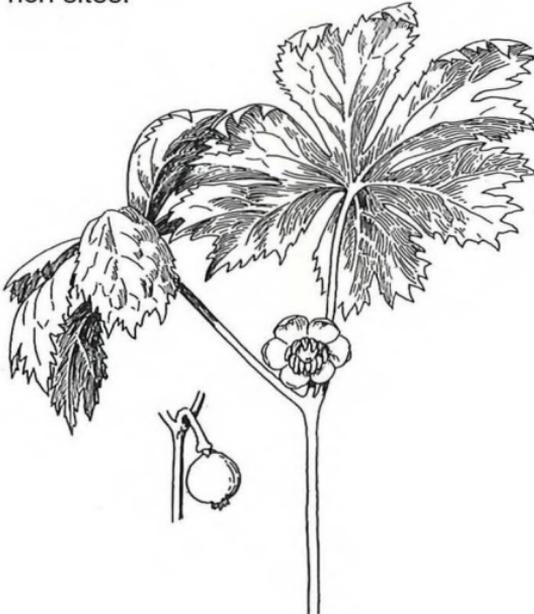
- Slender perennial up to 3' tall.
- One of the most common plants on dry-mesic to mesic habitat types.





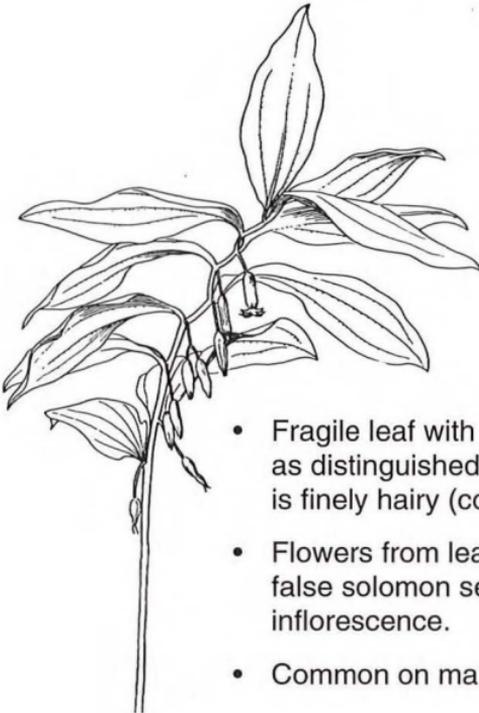
Podophyllum peltatum L.
May-apple

- Conspicuous umbrellalike leaves.
- Medium to rich sites.





Polygonatum pubescens (Willd.) Pursh
Hairy Solomon Seal



- Fragile leaf with stiff-hair along veins beneath as distinguished from rosey twisted-stalk which is finely hairy (comblike) along leaf margin.
- Flowers from leaf axils as distinguished from false solomon seal which flowers in a terminal inflorescence.
- Common on many habitat types.



Prenanthes alba L.
White lettuce

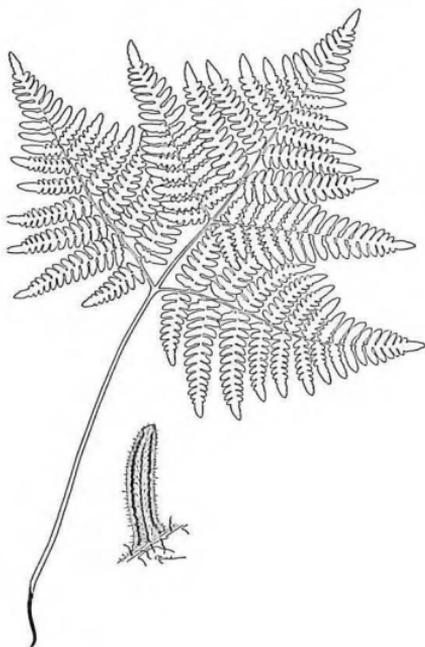
- Tall perennial (to 4') with milky sap
- Most common on richer sites.



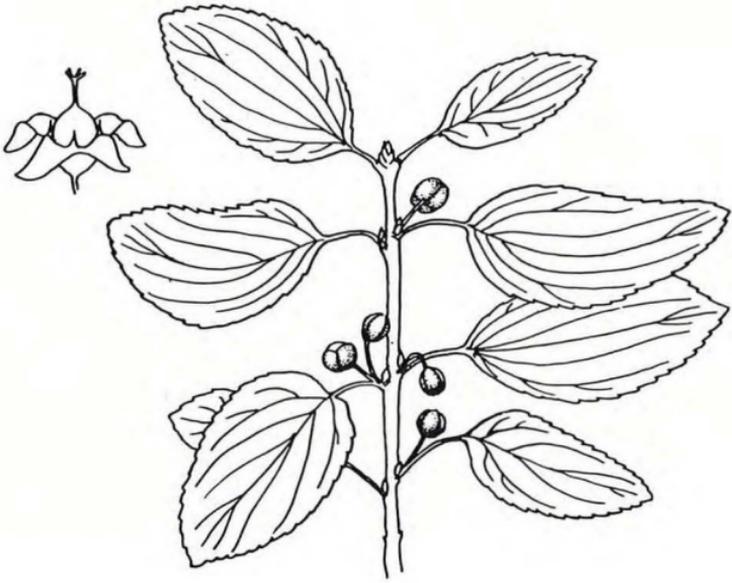


***Pteridium aquilinum* var. *latiusculum* (Brake)**
Bracken Fern

- Tall fern (2-4')
- Common on many dry to dry-mesic habitat types.



Herb



Rhamnus cathartica L.
Common Buckthorn

- A tall shrub (6-20').
- Escaped from hedges and landscape plantings—can be a nuisance in some woodlands.
- Most common on former oak savanna sites.



***Rhus radicans* L.**
Poison ivy

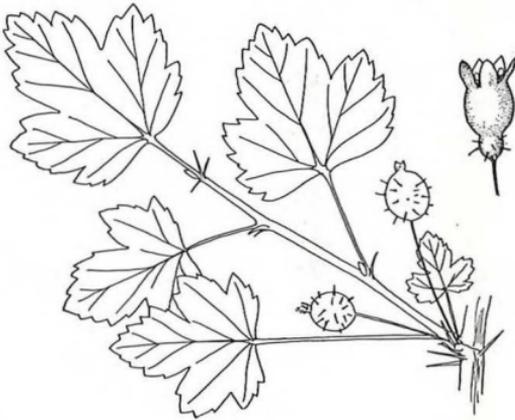
- Low shrub or climbing vine.
- Leaves shiny.
- Fruit cream-colored “berries.”



Shrub



Ribes cynosbati L.
Prickly Gooseberry



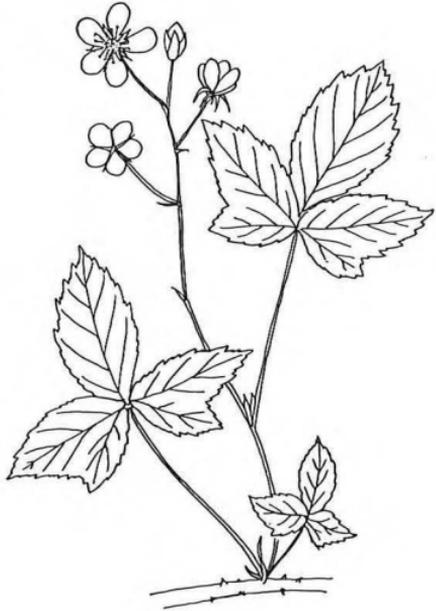
- Small shrub (1-4' tall).
- Spines on nodes and fruits.
- Difficult to distinguish from many other species of Ribes.
- Best represented on nutrient-rich sites.

Shrub



Rubus Hispidus L.
Swamp Dewberry

- Small trailing plant with spines.
- Leaves dark-green, somewhat shiny, often persisting through winter.
- Sites with poor drainage.

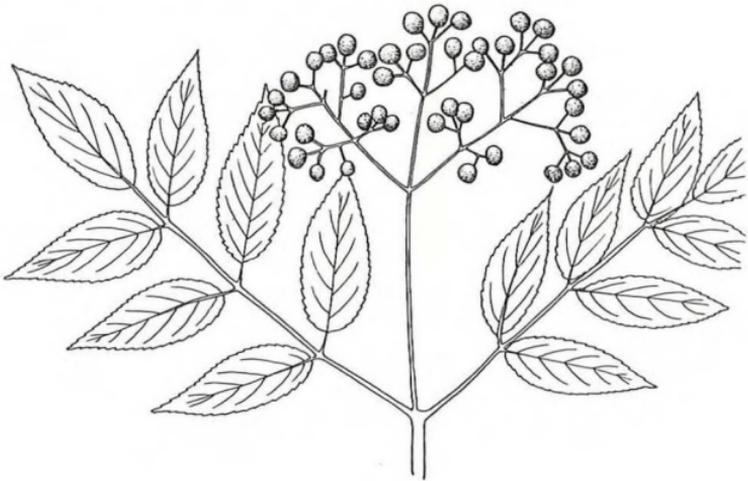


Dwarf shrub



Sambucus canadensis L.
Common Elder

- A tall shrub (3-12').
- Flowers white, fruit black.
- Mostly on mesic sites.



Shrub



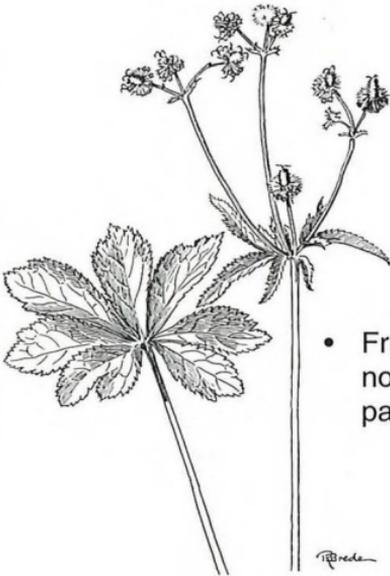
Sanguinaria canadensis L.
Bloodroot

- Stem juice red to reddish-orange.
- Found primarily on mesic, nutrient-rich habitat types.





***Sanicula marilandica* L.**
Black Snakeroot



- Fruiting plant can be up to 4 feet tall; non-fruiting plant consists of one palmate leaf.



***Smilacina racemosa* (L.) Desf.**
False Solomon's Seal

- Do not confuse with rosey twisted-stalk or hairy solomon's seal. flowers on false solomon's seal are borne in a terminal inflorescence while latter two are borne in leaf axils.





Smilacina stellata (L.) Desf.
Star-flowered Solomon's Seal

- Leaves sessile to nearly clasping at the base.
- Most often found on dry habitat types.



Herb



Smilax herbacea L.
Carrion flower

- Arching or climbing plant with ill-smelling flowers.
- Similar to *Smilax tamnoides* (bristly greenbrier), which has bristly or spiny stems.



Vine



Solanum dulcamara L.
Bittersweet nightshade

- Perennial vine (poisonous).
- Most often found in moist clearings, but also in some mesic forests.



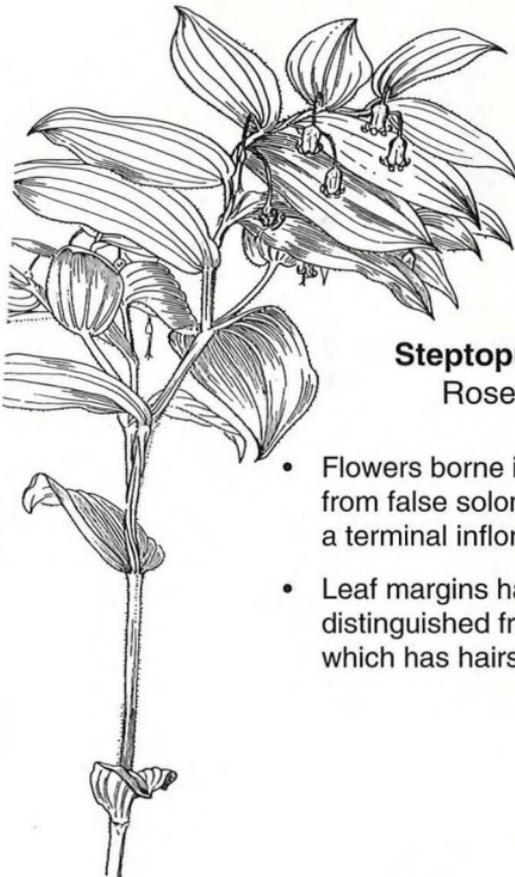


Solidago flexicaulis L.
Zigzag or Broad-leaved
Goldenrod

- Stem zigzags and is somewhat angled; 1-3' tall.
- Most common on richer sites.



Herb



Steptopus roseus Michx.
Rosey Twisted-stalk

- Flowers borne in leaf axils as distinguished from false solomon seal which are borne in a terminal inflorescence.
- Leaf margins has stiff hair (comblike) as distinguished from hairy solomon seal which has hairs along veins beneath leaf.

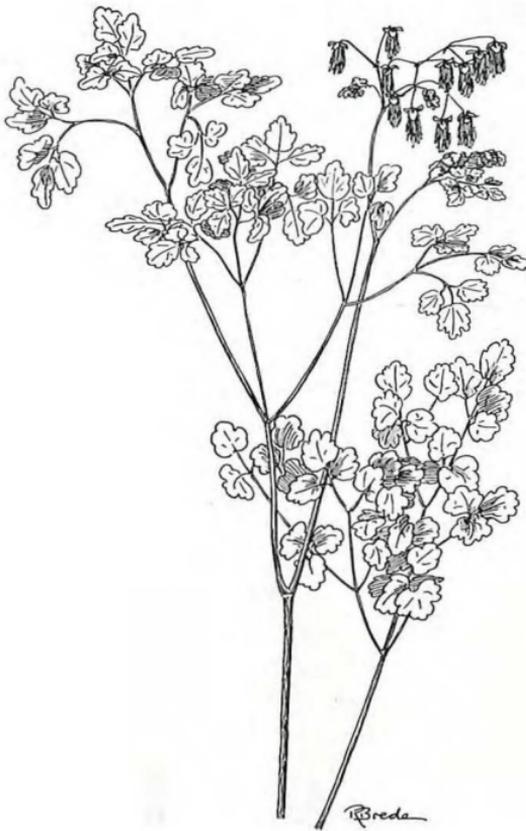


Symplocarpus foetidus (L.) Nutt.
Skunk-cabbage



- Stemless plant with skunklike odor.
- Found only on some wet sites.

Herb



Thalictrum dioicum
Early Meadow Rue

- Tall herb, up to 3'
- Can be confused with Aquilegia sp. (columbine) when flowers not present.



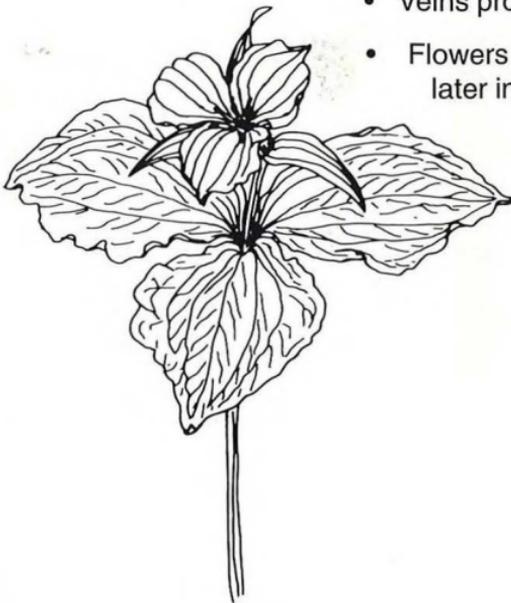
Trientalis borealis Raf.
Starflower



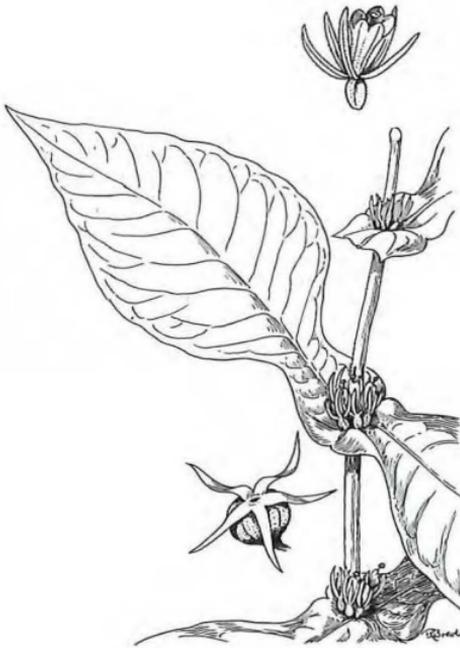
- Distinctly elongated lanceolate leaves, clustered at the top of a slender stem.
- Found on many northern habitat types, rare in southern Wisconsin.



Trillium grandiflorum (Michx.) Salisb.
Large-flowered Trillium



- Veins prominent and netted.
- Flowers large, white, turning pink later in season.
- Leaves somewhat resemble those of *Arisaema atrorubens* (Jack-in-the-pulpit) but secondary veins in the latter join along the margin.



Triosteum aurantiacum L.
Orange-fruited horse gentian

- Tall herb (2-4').
- Leaves egg-shaped.
- Fruit red to orange, resembling a small, hard tomato.

*Note: This illustration is a closely related T. perfoliatum.
T. aurantiacum has clasping rather than perfoliated petioles.*



Urtica spp.
Stinging nettle (Tall nettle)

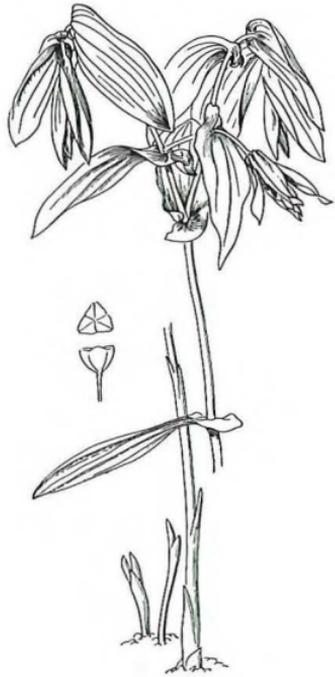
- Erect herb up to 4' tall with stinging hairs.
- Most common on mesic to wet-mesic, nutrient-rich habitat types..

Herb



***Uvularia grandiflora* Sm.**
Large-flowered Bellwort

- Leaves perfoliate (stem passes through the base of the leaf).
- Flowers bell-shaped, yellow.
- Mesic to dry mesic, nutrient medium to rich habitat types.

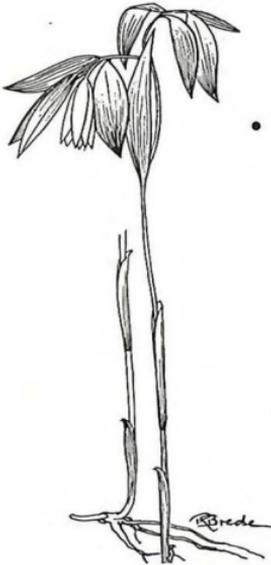


Herb



Uvularia sessilifolia L.
Sessile Bellwort or Wild Oats

- Similar to *Uvularia grandiflora*, but leaves sessile instead of perfoliate. Plant smaller and leaves narrower.



Herb



***Vaccinium angustifolium* (Ait.) Gray**
Low Sweet Blueberry

- Low shrub with glabrous green stems and leaves with finely serrate leaf margins as distinguished from Canada blueberry which has pubescent stems and smooth leaf margins.
- Found on sandy soils.

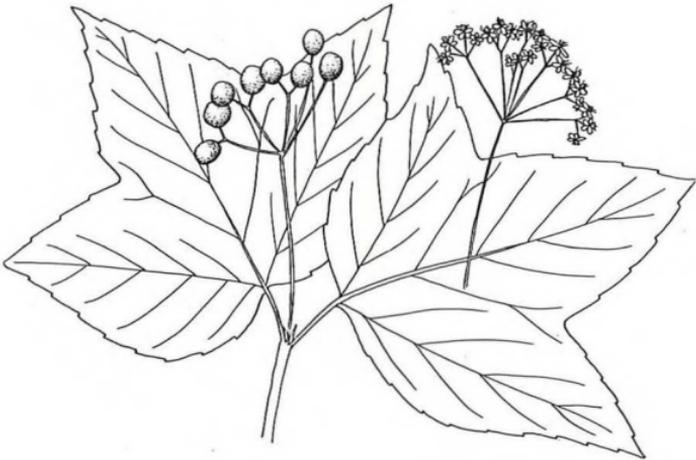


Shrub



Viburnum acerifolium L.
Mapleleaf Viburnum

- Leaf has a maple shape.
- Medium shrub (3-6 feet).
- Most common on dry-mesic habitat types.



Shrub



Viburnum lentago L.
Nannyberry

- A large shrub or small tree.
- Finely toothed, pointed leaves.
- Most common on richer and moist sites.

Shrub



***Viburnum rafinesquianum* Schult.**
Downy Arrowwood

- Low shrub (up to 6' tall).
- Leaves opposite, margin coarsely toothed.
- Petioles very short, with soft down when young.



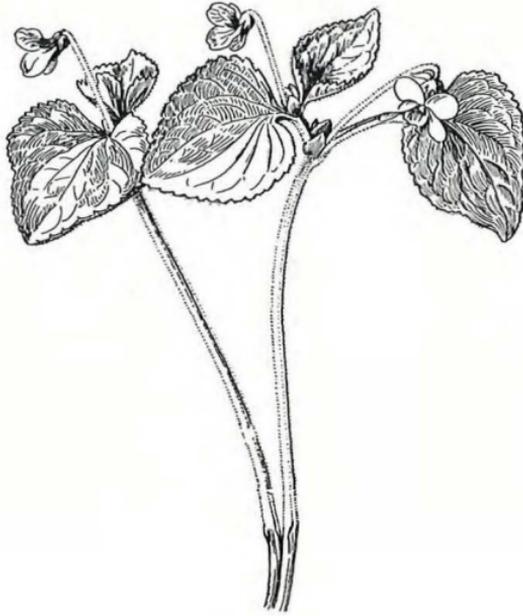
Shrub



***Viola pensylvanica* Michx.**
Smooth Yellow Violet



- Multi-branched glabrous violet having basal leaves as distinguished from downy violet which is pubescent and does not have basal leaves.



***Viola pubescens* Ait.**
Downy Yellow Violet

- Downy stem, leaves, and seed capsule. Has no basal leaves.
- Should not be confused with smooth yellow violet which is glabrous and has basal leaves.



Vitis Riparia Michx.
River-bank Grape

- A large climbing or trailing vine.
- In spite of its name it is commonly found in forests.



Figure 7.1. Guide for estimating plant coverage.

Each quarter of any one square has the same amount of black.

