INTERNATIONAL ECOLOGICAL CLASSIFICATION STANDARD:

TERRESTRIAL ECOLOGICAL CLASSIFICATIONS

Land Between the Lakes National Recreation Area (Kentucky, Tennessee) Interim Report

April 30, 2004

by

NatureServe

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This subset of the International Ecological Classification Standard covers vegetation associations and alliances attributed to the Land Between the Lakes National Recreation Area (Kentucky, Tennessee**).** This classification has been developed in consultation with many individuals and agencies and incorporates information from a variety of publications and other classifications. Comments and suggestions regarding the contents of this subset should be directed to Milo Pyne milo_pyne@natureserve.org.

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[1] NatureServe is an international organization including NatureServe regional offices, a NatureServe central office, U.S. State Natural Heritage Programs, and Conservation Data Centres (CDC) in Canada and Latin America and the Caribbean. Ecologists from the following organizations have contributed the development of the ecological systems classification:

United States
Central NatureServe Office, Arlington, VA; Eastern Regional Office, Boston, MA; Midwestern Regional Office, Minneapolis, MN; Southeastern Regional Office, Durham, NC; Western Regional Office, Boulder, CO; Alabama Natural Heritage Program, Montgomery AL; Alaska Natural Heritage Program, Anchorage, AK; Arizona Heritage Data Management Center, Phoenix AZ; Arkansas Natural Heritage Commission Little Rock, AR; Blue Ridge Parkway, Asheville, NC; California Natural Heritage Program, Sacramento, CA; Colorado Natural Heritage Program, Fort Collins, CO; Connecticut Natural Diversity Database, Hartford, CT; Delaware Natural Heritage Program, Smyrna, DE; District of Columbia Natural Heritage Program/National Capital Region Conservation Data Center, Washington DC; Florida Natural Areas Inventory, Tallahassee, FL; Georgia Natural Heritage Program, Social Circle, GA; Great Smoky Mountains National Park, Gatlinburg, TN; Gulf Islands National Seashore, Gulf Breeze, FL; Hawaii Natural Heritage Program, Honolulu, Hawaii; Idaho Conservation Data Center, Boise, ID; Illinois Natural Heritage Division/Illinois Natural Heritage Database Program, Springfield, IL; Indiana Natural Heritage Data Center, Indianapolis, IN; Iowa Natural Areas Inventory, Des Moines, IA; Kansas Natural Heritage Inventory, Lawrence, KS; Kentucky Natural Heritage Program, Frankfort, KY; Louisiana Natural Heritage Program, Baton Rouge, LA; Maine Natural Areas Program, Augusta, ME; Mammoth Cave National Park, Mammoth Cave, KY; Maryland Wildlife & Heritage Division, Annapolis, MD; Massachusetts Natural Heritage & Endangered Species Program, Westborough, MA; Michigan Natural Features Inventory, Lansing, MI; Minnesota Natural Heritage & Nongame Research and Minnesota County Biological Survey, St. Paul, MN; Mississippi Natural Heritage Program, Jackson, MI; Missouri Natural Heritage Database, Jefferson City, MO; Montana Natural Heritage Program, Helena, MT; National Forest in North Carolina, Asheville, NC; National Forests in Florida, Tallahassee, FL; National Park Service, Southeastern Regional Office, Atlanta, GA; Navajo Natural Heritage Program, Window Rock, AZ; Nebraska Natural Heritage Program, Lincoln, NE; Nevada Natural Heritage Program, Carson City, NV; New Hampshire Natural Heritage Inventory, Concord, NH; New Jersey Natural Heritage Program, Trenton, NJ; New Mexico Natural Heritage Program, Albuquerque , NM; New York Natural Heritage Program, Latham, NY; North Carolina Natural Heritage Program, Raleigh, NC; North Dakota Natural Heritage Inventory, Bismarck, ND; Ohio Natural Heritage Database, Columbus, OH; Oklahoma Natural Heritage Inventory, Norman, OK; Oregon Natural Heritage Program, Portland, OR; Pennsylvania Natural Diversity Inventory, PA; Rhode Island Natural Heritage Program, Providence, RI; South Carolina Heritage Trust, Columbia, SC; South Dakota Natural Heritage Data Base, Pierre, SD; Tennessee Division of Natural Heritage, Nashville, TN; Tennessee Valley Authority Heritage Program, Norris, TN; Texas Conservation Data Center, San Antonio, TX; Utah Natural Heritage Program, Salt Lake City, UT; Vermont Nongame & Natural Heritage Program, Waterbury, VT; Virginia Division of Natural Heritage, Richmond, VA; Washington Natural Heritage Program, Olympia, WA; West Virginia Natural Heritage Program, Elkins, WV; Wisconsin Natural Heritage Program, Madison, WI; Wyoming Natural Diversity Database, Laramie, WY

Canada
Alberta Natural Heritage Information Centre, Edmonton, AB, Canada; Atlantic Canada Conservation Data Centre, Sackville, New Brunswick, Canada; British Columbia Conservation Data Centre, Victoria, BC, Canada; Manitoba Conservation Data Centre. Winnipeg, MB, Canada; Ontario Natural Heritage Information Centre, Peterborough, ON, Canada; Quebec Conservation Data Centre, Quebec, QC, Canada; Saskatchewan Conservation Data Centre, Regina, SK, Canada; Yukon Conservation Data Centre, Yukon, Canada

Latin American and Caribbean
Centro de Datos para la Conservacion de Bolivia, La Paz , Bolivia; Centro de Datos para la Conservacion de Colombia, Cali,Valle, Columbia; Centro de Datos para la Conservacion de Ecuador, Quito, Ecuador; Centro de Datos para la Conservacion de Guatemala, Ciudad de Guatemala , Guatemala; Centro de Datos para la Conservacion de Panama, Querry Heights , Panama; Centro de Datos para la Conservacion de Paraguay, San Lorenzo , Paraguay; Centro de Datos para la Conservacion de Peru, Lima, Peru; Centro de Datos para la Conservacion de Sonora, Hermosillo, Sonora , Mexico; Netherlands Antilles Natural Heritage Program, Curacao , Netherlands Antilles; Puerto Rico-Departmento De Recursos Naturales Y Ambientales, Puerto Rico; Virgin Islands Conservation Data Center, St. Thomas, Virgin Islands.

NatureServe also has partnered with many International and United States Federal and State organizations, which have also contributed significantly to the development of the International Classification. Partners include the following The Nature Conservancy; Provincial Forest Ecosystem Classification Groups in Canada; Canadian Forest Service; Parks Canada; United States Forest Service; National GAP Analysis Program; United States National Park Service; United States Fish and Wildlife Service; United States Geological Survey; United States Department of Defense; Ecological Society of America; Environmental Protection Agency; Natural Resource Conservation Services; United States Department of Energy; and the Tennessee Valley Authority. Many individual state organizations and people from academic institutions have also contributed to the development of this classification.

PREFACE

This report is a final product resulting from a continuing agreement between NatureServe, The Nature Conservancy (TNC) and USDA Forest Service Region 8. This agreement provides for the application of the United States National Vegetation Classification (USNVC) standard to all Region 8 National Forests, resulting in a basic list of vegetation units (alliances and community associations) presented on a Forest by Forest basis. The USNVC provides a framework for vegetation classification and is intended to serve as a tool for conservation planning and biodiversity protection, as well as resource planning, management, and vegetation mapping. In the southeastern United States, the USNVC is being developed in cooperation with the state Natural Heritage Programs, the USDA Forest Service, and other state and Federal partners. Its development has involved consultation with many individuals and agencies and incorporates information from a variety of publications and other classifications

This classification subset includes all alliances and community associations presently attributed to the Land Between the Lakes National Recreation Area (Kentucky, Tennessee), as well as some that are thought to occur there but for which more data are needed to confirm their occurrence. This report is intended for review and use by Forest Service personnel and other ecologists working in this geographic area. Neither specific field reconnaissance nor data collection was conducted on this unit, and this report does not necessarily include all of the rare or unusual communities that are present, but probably does include all the major vegetation types which would be expected there. Due to this lack of field work, the classification could undoubtedly benefit from additional activity in this unit, both in regard to additional data collection, but also acquisition and analysis of existing vegetation data.

We hope that the issuance of this admittedly insufficient report will stimulate the need for additional vegetation survey work on this National Recreation Area, whose conservation is critical for maintaining the biodiversity of this part of Kentucky and Tennessee. In particular, the stream and floodplain communities seem to be poorly attributed to this unit, and this could be easily remedied.

The vegetation classification produced through this agreement will form the foundation for continuing use of the USNVC on U.S. Forest Service lands in Region 8 for natural resource planning and management. Because this is an interim report, the classification is incomplete and will rely on feedback and additional fieldwork to improve its coverage of the individual unit. We expect refinements, revisions, and additions to be made to this classification based on review by Forest Service personnel, review of other vegetation studies, and additional analysis of data. In the meanwhile, the entire National Vegetation Classification is available on-line in a fully searchable database that is updated on a quarterly basis (www.NatureServe.org).

Comments and suggestions for additions or revisions are welcome and encouraged. Please submit comments to the authors at the following address: NatureServe; Southern U. S. Office, 6114 Fayetteville Road, Suite 109, Durham, NC 27713-6284 or by phone or electronic mail: Milo Pyne: 919-484-7857 x 136 (milo_pyne@natureserve.org).

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We have freely integrated data and other published and unpublished information into the classification for this land unit. We would like to specifically acknowledge the contributions of Dr. Edward W. (Wayne) Chester of Austin Peay State University, Dr. James S. Fralish of the University of Southern Illinois, Dr. Scott Franklin of the University of Memphis, Dr. Julian Campbell of The Nature Conservancy Kentucky Field Office, Marc Evans of the Kentucky State Nature Preserves Commission (KSNPC), and Claude Bailey, C. Smoot Major, and Roger McCoy of the Tennessee Division of Natural Heritage.

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INTRODUCTION

Background

NatureServe (formerly the Association for Biodiversity Information [ABI]) is a not-for-profit organization dedicated to developing and providing knowledge about the world's natural diversity. Working in partnership with 75 independent Natural Heritage programs and conservation data centers that gather scientific information on rare plants and animals and ecosystems in the U.S., Latin America, and Canada, NatureServe is a leading source for the biodiversity information that is essential for effective conservation action.

NatureServe was formed in July 1999 when The Nature Conservancy and the Natural Heritage Network jointly established an independent organization to achieve their mutual goal of advancing the application of biodiversity information to conservation. Although NatureServe is a new organization, its databases, staff expertise, and methods reflect more than 25 years of experience, research, and development. NatureServe addresses biodiversity information needs at the regional, national, and international levels, complementing the availability of detailed state or province-level information from individual Natural Heritage programs.

NatureServe is continuing to implement and advance approaches to the conservation of biological diversity that have been employed since 1975 by The Nature Conservancy (TNC) and the Network of Natural Heritage Programs. One component of this methodology is referred to as a "coarse filter/fine filter" approach to biological diversity conservation (Jenkins 1976, Hunter 1991). This methodology involves the identification and protection of ecological communities (coarse filter) as well as rare species (fine filter). Identifying and protecting representative examples of all ecological communities assures the conservation and maintenance of biotic interactions and ecological processes, in addition to conservation of most species. Those species whose conservation is not adequately assured through the conservation of communities -- those that fall through the coarse community filter -- are generally the rarest species. These species often have specialized life histories, or are simply so rare and restricted that their conservation requires explicit planning based on species-specific information. Using a combination of communities and species as conservation targets ensures protection of a more complete spectrum of biological diversity.

A major obstacle to using ecological communities as conservation units for national, regional, and global projects was the lack of a consistent classification system, developed through analysis of community data from a range-wide perspective. NatureServe and TNC, in conjunction with the network of Natural Heritage Programs and Conservation Data Centers, began developing a standardized, hierarchical vegetation classification system. This system, known as the International Ecological Classification Standard (IECS) (formerly called the International Classification of Ecological Communities [ICEC]), has now been used to classify and describe terrestrial communities across the United States and other parts of the world (Grossman *et al*. 1994, Grossman *et al*. 1998).

For the past decade, TNC, NatureServe and the international network of Natural Heritage Programs and Conservation Data Centers (CDC) have been developing the IECS. Within the United States, the domestic component of the international effort, the United States National Vegetation Classification (USNVC), has received widespread support from state, federal, academic, and international partners (Jennings 1993, Greenall 1996, Loucks 1996, FGDC 1997). For the first time, vegetation of all types, whether mountain bogs, shortleaf pine woodlands, or limestone glades can be treated together in one system. This classification serves many natural resource management purposes including conservation planning, biodiversity protection, scientific research, inventory, and mapping.

Many details of the classification are presented in a series of documents by NatureServe's Community Ecology Group (formerly TNC) (Grossman et al.1998, Anderson et al.1998, Maybury 1999). These documents include detailed background on the structure and development of the classification and are available on NatureServe's public web site (www.natureserve.org) under the Biodiversity Information/Ecological Communities link.

Purpose and Scope of the USNVC

The purpose of the USNVC classification system is to provide a complete, standardized listing and description of all vegetation types that represent the variation in biological diversity at the community level, and to identify those communities that require protection (Grossman et al. 1994). The shared mission of NatureServe and The Nature Conservancy is the protection of biodiversity; this, along with conservation planning, is also the principal objective for the development of the classification. The classification will be consistent throughout the United States and elsewhere at appropriate scales for conservation planning, and management, and long-term monitoring of ecological communities and ecosystems. It will also have applications as a vegetation data layer in landscape and ecosystem characterization and mapping.

Classifications of ecological systems can be based on a variety of biotic and abiotic factors including hydrology, soils, landform, and vegetation that may be used in combination or individually. The ICEC classification approach presented here is based on vegetation because it is a biotic factor and hence a measurement of biodiversity, which NatureServe and TNC are directed to protect. Moreover, it integrates environmental conditions, ecological processes, and biogeographical dynamics at a site more measurably than any other

factor or suite of factors (Mueller-Dombois and Ellenberg 1974, Kimmins 1997); it is often used to infer soil and climate patterns; and it can be easily measured.

The USNVC has been developed for terrestrial vegetation, that is, all upland terrestrial vegetation and all wetland vegetation with rooted vascular plants. In relation to Cowardin et al. (1979), terrestrial includes those portions of the palustrine, lacustrine, riverine, estuarine, and marine systems that have rooted vegetation. Classification of this vegetation (the Terrestrial System) is distinct from that of unvegetated deep-water habitats (Freshwater and Marine Systems) and unvegetated subterranean habitats (Subterranean System), all of which will have their own classification systems (e.g. Lammert et al. 1997).

The classification system focuses on existing vegetation rather than potential natural vegetation, “climax vegetation”, or physical habitats. The vegetation types described in the classification range from the ephemeral to the stable and persistent. Recognizing and accommodating this variation is fundamental to protecting biodiversity. The manner in which a community occurs is, in part, an intrinsic property of the vegetation itself. A classification that is not restricted to static vegetation types ensures that the units are useful both for inventory/site description, and as the basis for building dynamic ecological models.

The USNVC includes vegetation occurring anywhere along the continuum of "natural" to “invasive” to “cultural", but it emphasizes vegetation types that are "natural" since these communities are the focus of biodiversity protection. Broadly speaking, natural types include a range of naturalness, namely, "natural" (narrowly defined), "semi-natural" and "modified" vegetation, which together reflect differences in anthropogenic disturbance regimes. However, all natural types occur spontaneously without regular human management, maintenance, or planting, and generally have a strong component of native species (see below). Natural vegetation, narrowly defined, includes plant communities that appear not to have been modified by human activities or only those human activities that mimic natural processes (e.g. prescribed burning). The term semi-natural can include “plant communities where the structure of vegetation has been changed through human activities, but where the species composition is natural” (van der Maarel and Klötzli 1996). In contrast to natural vegetation, then, "cultural" vegetation can be recognized as that which includes planted/cultivated vegetation types. Cultural, modified and exotic vegetation is classified in the USNVC at a much coarser scale than natural and semi-natural vegetation, but other organizations and agencies may refine these coarse units further. To date, most units described with the finest levels in the classification system (association) have been natural and semi-natural types. However, when necessary, modified, cultural and exotic types have been identified in the classification system, especially for the purpose of vegetation mapping. Exotic vegetation is differentiated at association level.

The USNVC has a hierarchical taxonomic structure that is a combination of physiognomic and floristic systems. The rationale for coupling physiognomic and floristic systems has developed over many years (e.g., Rübel 1930, Whittaker 1962, Ellenberg 1963, Webb et al. 1970, Westhoff 1967, Beard 1973, Werger and Spangers 1982, Borhidi 1991). These studies have found a good correlation between floristic and physiognomic classifications of the same vegetation. In the United States, Driscoll et al. (1984) recommended the development of a joint system using the physiognomic units of UNESCO (1973) and the floristic units of habitat types, of which an example has been provided by Dick-Peddie (1993) for New Mexico. The USNVC uses a similar methodology. Vankat (1990) developed a physiognomic-dominance type classification for forest types in North America. Strong et al. (1990) in Canada also proposed a combined physiognomic-floristic approach.

A Combined Physiognomic/Floristic System

The hierarchy of the classification system employs physiognomic criteria at the highest levels and floristic criteria at the lower levels. The formation concept, with units modified from UNESCO (1973), guides the definition of the physiognomic units, and the association and alliance concepts define the floristic units (see Figure 1 and Table 1)**.** This system allows the broad-scale geographic application of physiognomic characteristics to be tied to local, site-specific, floristically-defined units. In combination, these hierarchical levels can satisfy a broad range of objectives for use in a single classification system.

FIGURE 1. VEGETATION CLASSIFICATION SYSTEM.

SYSTEM							
	FORMATION CLASS						
		FORMATION SUBCLASS					
			FORMATION GROUP				
				SUBGROUP			
physiognomic levels					FORMATION		
floristic levels						ALLIANCE	
							PLANT ASSOCIATION

TABLE 1. HIERARCHICAL VEGETATION CLASSIFICATION SYSTEM FOR TERRESTRIAL ECOLOGICAL COMMUNITIES. (Examples)

CLASS	FOREST	WOODLAND	SHRUBLAND
SUBCLASS	Deciduous Forest	Evergreen Woodland	Deciduous Shrubland
GROUP	Cold-deciduous Forest	Temperate or Subpolar Needle-leaved Evergreen Woodland	Temperate Broad-leaved Evergreen Shrubland
SUBGROUP	Natural/Semi-natural	Natural/Semi-natural	Natural/Semi-natural
FORMATION	Lowland or Submontane Cold-deciduous Forest	Saturated Temperate or Subpolar Needle-leaved Evergreen Woodland	Sclerophyllous Temperate Broad-leaved Evergreen Shrubland
ALLIANCE	*Quercus stellata - Quercus marilandica* Forest Alliance	*Pinus palustris* Saturated Woodland Alliance	*Quercus havardii* Shrubland Alliance
ASSOCIATION	*Quercus stellata - Quercus marilandica – Carya (glabra, texana) / Vaccinium arboreum* Forest	*Pinus palustris / Leiophyllum buxifolium / Aristida stricta* Woodland	*Quercus havardii - (Penstemon ambiguus, Croton dioicus) / Sporobolus giganteus* Shrubland

The combined physiognomic/floristic system developed by TNC/NatureServe allows identification of units from both a "top-down" (divisive) and "bottom-up" (agglomerative) approach. The top-down approach allows the use of physiognomic distinctions to help map vegetation, to stratify sampling, and to delimit vegetation units where floristic information is lacking. A bottom-up approach employs plot sampling and floristic analysis as the primary means for defining associations. Where physiognomy is variable, the bottom-up approach can also be used to help determine the important physiognomic distinctions. The relationships between physiognomy and floristics are not always simple; when they do not correspond, precedent may be given to the floristic relationships over the physiognomic structure.

The basic unit of inventory, the plant association or community element, is more or less uniform in structure, composition, and habitat. The uniformity of the plant community makes the comparison and identification of protection priorities more objective than would be possible at more heterogeneous scales. The plant association is a suitable unit for conservation planning because it encompasses all the layers of vegetation in a stand, reflects ecological and human-caused processes including management activities, and is a repeating unit in different landscapes. From a site-based perspective, there may be many different community types at a given location. In fact, it is relatively rare that a site contains only a single community type. However, community elements tend to combine in predictable ways to create repeatable landscape mosaics. Thus the particular mosaic of community elements present at a site and their distribution across the landscape provide information that is fundamental to any type of ecological land management.

The rationale for coupling physiognomic and floristic systems has been developed over the years (e.g., Rubel 1930, Whittaker 1962, Ellenberg 1963, Webb *et al*. 1970, Westhoff 1967, Beard 1973, Werger and Spangers 1982). These studies have found a good fit between floristic and physiognomic classifications of the same vegetation. In the United States, Driscoll *et al*. (1984) recommended the development of a joint system using the physiognomic units of UNESCO (1973) and the floristic units of habitat types, of which an example has recently been provided by Dick-Peddie (1993) in New Mexico. Vankat (1990) developed a physiognomic-dominance type classification for forest types in North America. Strong *et al*. (1990) in Canada also proposed a combined physiognomic-floristic approach. In addition, Specht *et al*. (1974) used the joint approach to develop a conservation evaluation for Australian plant communities.

Terrestrial Vegetation; “Natural” and “Semi-natural” Types

The TNC physiognomic-floristic classification has been developed for terrestrial vegetation, that is, all upland terrestrial vegetation and all wetland vegetation with rooted vascular plants. In relation to Cowardin *et al*. (1979), terrestrial includes those portions of the palustrine, lacustrine, riverine, estuarine, and marine systems that have rooted vegetation. Classification of this vegetation (the Terrestrial System) is distinct from that of unvegetated deep-water habitats (Freshwater and Marine Systems) and unvegetated subterranean habitats (Subterranean System), all of which will have their own classification systems (e.g. Lammert *et al*. 1997).

The USNVC includes all existing vegetation, occurring anywhere along the continuum of "natural" to “cultural", but TNC has emphasized vegetation types that are "natural" since these communities are the focus of biodiversity protection. The classification system separates natural/semi-natural types from cultural types at a certain level in the hierarchy (the formation subgroup, see table 1). Broadly speaking, natural types include a range of naturalness, namely, "natural" (narrowly defined), "semi-natural" and "modified" vegetation, which together reflect differences in anthropogenic disturbance regimes. All natural types occur spontaneously without regular human management, maintenance, or planting, and generally have a strong component of native species. More specifically, "natural" vegetation includes plant communities that appear not to have been significantly modified by human activities, and "semi-natural" vegetation includes plant communities where the structure of vegetation has been noticeably changed through human activities, but where the species composition is unchanged (van der Maarel and Klotzli 1996). In contrast to natural vegetation, then, "cultural" vegetation can be recognized as that which includes planted/cultivated vegetation types. For cultural and modified vegetation,

TNC classifies at a much coarser scale than for natural and semi-natural vegetation, but other organizations and agencies may refine these coarse units further. To date, most units described with the finest levels in the classification system have been natural and semi-natural types. However, when necessary, modified and cultural types have been identified in the classification system, especially for the purpose of vegetation mapping.

Physiognomic Levels: Description And Definitions

The hierarchy for the Terrestrial System has seven levels, with five physiognomic levels (formation class, formation subclass, formation group, formation subgroup and formation) and two floristic levels (alliance and association), see Figure 1. The basic unit of the physiognomic portion of the classification is the "formation", a "community type defined by dominance of a given growth form in the uppermost stratum (or the uppermost closed stratum) of the vegetation, or by a combination of dominant growth forms" (Whittaker 1962, see also Schrader-Frechette and McCoy 1993). In practice, formations are defined by varied, conventionally-accepted combinations of growth-form dominance and characteristics of the environment (e.g., cold-deciduous alluvial forests, rounded-crowned temperate needle-leaved evergreen forest, seasonally flooded perennial forb vegetation).

The physiognomic portion of the classification is based upon the UNESCO (1973) world physiognomic classification of vegetation, which was modified and refined to provide greater consistency at all hierarchical levels and to include additional physiognomic types. Some of the revisions made by Driscoll *et al*. (1984) for the United States were incorporated, and the international scope was expanded.

Compatibility with other systems was also a consideration in the development of the physiognomic levels. The subclass level of UNESCO was modified and a new Formation Subgroup that separates natural vegetation from cultural vegetation was added to better conform to the Federal Geographic Data Committee's (FGDC) standards for vegetation classification (FGDC 1997). Hydrological modifiers based on Cowardin *et al*. (1979) also were added at the formation level since they have been used extensively to map wetlands across the United States. Each of the physiognomic levels is described in more detail by Grossman *et al*. (1998).

Floristic Levels: Description And Definitions

Since this report focuses on the floristic levels of the USNVC, the alliance and the association, the following sections provide more detail about these classification units.

THE ALLIANCE CONCEPT

The alliance is a physiognomically uniform group of plant associations (see Association definition below) sharing one or more diagnostic species (dominant, differential, indicator or character), which, as a rule, are found in the dominant and/or uppermost strata of the vegetation (Mueller-Dombois and Ellenberg 1974). Dominant species are often emphasized in the absence of detailed floristic information (such as quantitative plot data), whereas diagnostic species (including characteristic species, dominant differential, and other species groupings based on constancy) are used where detailed floristic data are available (Moravec 1993). The alliance level includes existing (not just “climax” or potential) vegetation types.

For forested communities, the alliance is similar to the “cover type” of the Society of American Foresters (Eyre 1980), developed to describe the forest types of North America. An alliance is equivalent to a cover type when the dominant species also have diagnostic value. The alliance may be finer than a cover type when the dominant species extend over large geographic areas and varied environmental conditions especially when a diagnostic species occurs in different climate zones or in both upland and wetland situation. The concept for the alliance is also similar to the concept of the “series”, a concept developed by the Habitat Type System to group habitat types that share the same dominant species under climax conditions (Daubenmire 1952, Pfister and Arno 1980). Alliances, however, are described by the diagnostic species for all existing vegetation types, whereas series are restricted to climax types and are described by the primary dominant species (see Pfister and Arno 1980).

Examples include:

- *Fagus grandifolia - Quercus alba* Forest Alliance;
- *Quercus alba – (Quercus rubra, Carya* spp.*)* Forest alliance
- *Nyssa (aquatica, biflora, ogeche)* Pond Seasonally Flooded Forest Alliance
- *Fagus grandifolia - Magnolia grandiflora* Forest Alliance
- *Pinus pungens - (Pinus rigida)* Woodland Alliance
- *Quercus stellata – Quercus marilandica* Woodland Alliance
- *Cephalanthus occidentalis* Semipermanently Flooded Shrubland Alliance
- *Alnus serrulata* Saturated Shrubland Alliance
- *Andropogon virginicus* Herbaceous Alliance

The use of a joint physiognomic-floristic classification influences the alliance concept developed in the national classification. The alliance is constrained both by the floristic patterns of the associations it contains and by the physiognomic-ecologic patterns of the formation that it represents. From a top-down perspective, this facilitates identification of alliances. Information from a wide variety of sources that describes the dominant species of different formations (e.g., wet meadows, saturated peatlands, or temperate broad-leaved evergreen forests) can be used to develop some initial floristic groupings. From a bottom-up perspective, however, this may lead to alliances that differ physiognomically, but otherwise share many species in common. Associations that share a number of dominant or diagnostic species may be placed under different alliances that are in separate formations.

Guidelines for alliance nomenclature are as follows. Dominant and diagnostic species are identified from the dominant and/or top strata of the vegetation. Species placed in parentheses are less consistently found in all associations of the alliance, and the names within parentheses generally are listed alphabetically. Vascular plant species nomenclature follows the nationally standardized list, Kartesz (1999), with very few exceptions. Nomenclature for nonvascular plants follows Anderson (1990), Anderson *et al.* (1990), Egan (1987, 1989, 1990), Esslinger and Egan (1995), and Stotler and Crandall-Stotler (1977). Alliance names include the formation class in which they are listed, e.g., *Pinus ponderosa* Forest Alliance. For wetland alliances, the hydrologic regime that the alliance is found in is always provided for clarity, e.g., *Acer saccharinum* Temporarily Flooded Forest Alliance. Therefore, all alliances that have no hydrological modifier are upland alliances. Environmental or geographic descriptors are used sparingly, to more clearly separate alliances with the same nominal species or to provide clarity when differential species are not yet known (e.g., *Quercus stellata* Flatwoods Forest Alliance; *Acer grandidentatum* Montane Forest Alliance; *Taxodium ascendens* Tropical Woodland Alliance).

THE ASSOCIATION CONCEPT

The association (or plant association) is the finest level of the classification system. For the terrestrial system, plant association is defined as "a plant community of definite floristic composition, presenting a uniform physiognomy, and growing in uniform habitat conditions" (Flahault and Schroter 1910). This basic concept has been used by most schools of vegetation classification (Whittaker 1962, Braun-Blanquet 1965, Westhoff and van der Maarel 1978). In this traditional sense, the plant association concept applies to existing vegetation regardless of successional status. The terms "association", "plant association", "community", and "community association" are used interchangeably.

The plant association is differentiated from the alliance level by additional plant species, found in any stratum, which indicate finer scale environmental patterns and disturbance regimes. This level is derived from analyzing complete floristic composition of the vegetation unit when plot data are available. In the absence of a complete data set, approximation of this level is reached by using available information on the dominant species or environmental modifiers, and their hypothesized indicator species. NatureServe will primarily use the plant association as the level at which community inventory and conservation action are aimed.

While this definition of a plant association is still generally accepted as an international standard, a few clarifications of the use of the definition for the USNVC may be helpful:

- "Habitat" refers to the combination of environmental conditions and ecological processes influencing the community.
- Uniformity of physiognomy and habitat conditions may include patterned heterogeneity (*e.g.*, hummock/hollow).
- As a rule, community elements occur repeatedly over the natural landscape.
- The scale of the community element varies. Among other factors, the variation is determined by the size and apparent homogeneity of the occurrences across the landscape, the amount of data that has been collected and the interpretation of these data by the field experts.
- The community element may be composed of a complex of plant associations that constitutes a functioning ecological unit if the plant associations always occur together (e.g., prairie mound and intermound, wooded ridge and swale complex).

Associations are named with one or more species from the alliance name, and have additional species that represent dominants or indicators from any layer of the vegetation. Associations are named with one or more component plant species, separated by punctuation to indicate strata, followed by a descriptor of the physiognomic class. Strata are separated by the 'forward slash' /, while species within strata are separated by hyphens. Nominal species which are substantially inconstant, that is, often absent in a given occurrence (stand) of the type, are placed in parentheses. Within a stratum, parenthetic species are always placed following nonparenthetic (more constant) species. If more than one species in a stratum is parenthetic, the species are separated by commas and alphabetized. For instance, the *Pinus palustris - Pinus (echinata, taeda)* Woodland can include stands dominated by a mixture of *Pinus palustris* and either or both *Pinus echinata* and *Pinus taeda*. An environmental or geographic descriptor such as wetland, mesic, serpentine, etc., are used sparingly, when species composition for a type is not known well enough to provide full representation using only species in a name. When an environmental/geographic descriptor is used, it is inserted between the floristic nominals and the class descriptor.

EXAMPLES: *Quercus palustris - Quercus bicolor - Quercus macrocarpa - Acer rubrum* Sand Flatwoods Forest
Quercus falcata - Quercus alba - Carya spp. Interior Plateau Forest

[Association name = floristic nominals in stratal order + [optional environmental/geographic descriptor] + class descriptor]

In theory, additional data will allow a modification to the name (for instance, addition of another nominal) to clearly separate this association from similar associations, and then the environmental/geographic descriptor will be unnecessary.

When an association has several layers, an attempt is made to include species that are dominants or indicators from at least the two most dominant layers. Indicator species are those species, other than dominants, which have been chosen to distinguish an association or alliance from others like it, or to indicate specific environmental conditions that have a controlling influence on vegetation in the community. However, the indicator species are seldom limited to the association. For instance, *Sideroxylon lanuginosum* is added to the name of the Gulf coast shell midden woodland to distinguish this type from its close relative, the Atlantic coast shell midden woodland, since its range does not extend onto the Atlantic Coast. At the same time, this *Sideroxylon* species is present in other communities along the Gulf Coast and in the lower Midwest.

The Purpose of Naming

The purpose of naming is, in a sense, obvious, but bears restating. The primary purpose of naming the units in a classification is to create a label for the units, to facilitate unambiguous communication. A secondary goal is to create a name which is meaningful and easy to remember and use (mnemonic). These purposes are somewhat in conflict. The primary purpose of an unambiguous label is met by 'Community association 2546', but such a label is not meaningful or easy to remember. A long descriptive name is meaningful, but difficult to remember and use. To meet these varying requirements, we try to create a name that is a good compromise between these needs. We also use codes and common names to achieve these sometimes conflicting needs.

While it is tempting to interpret the floristic name of an association as a shorthand description of the community, it is important to remember that the name is not a description. The name does not describe an association any more than the name of a species describes it. An association is defined by more than the nominal species used in its names -- it is defined as well based on relative similarity of overall floristic composition, vegetation structure, and environment. One does not expect to be able to recognize *Quercus alba* because it is an oak and white, or *Quercus virginiana* because it is an oak and "from Virginia". Each association in the classification has (or will have) a detailed description of the floristic composition, physiognomic structure, environment (soils, geology, hydrology, climate, etc.), dynamics (fire, flooding, succession, etc.), geographic distribution, and taxonomic distinction from similar associations.

Ideally, the name of an association should provide, to a person relatively knowledgeable about the vegetation of an area and familiar with the taxonomic and nomenclatural principles of the classification, a clear indication of the type. Thus, community names are more meaningful or descriptive than the names of species, but do not purport to provide a full diagnosis or description of the type.

In this report, at least three identifiers are provided for each association. The **NVCS association name** (or Global Name) is the scientific name of the association and uses Latin names of component species (as described above). The **Database Code** (or Element Code) is a unique, 10 character code assigned to each association in the USNVC. However, in this report the **Common Name,** which is an informal, descriptive name, is the identifier used at the beginning of each association description. Where Common Names have not been developed, a **Translated Name** (using common names instead of scientific names for nominal species) is provided. Since Common Names have not been standardized, the Element Code or Global Name should be use when querying any USNVC database or when providing input about the USNVC.

Applications of the Classification System

CONSERVATION RANKING AND ITS USE IN PLANNING

The ability to apply conservation ranks to vegetation units is integral to the success of the classification system as a tool in biodiversity conservation. Associations are ranked by their relative endangerment to determine their relative conservation priority. These ranks are based on factors such as present geographic extent, threats, number of distinct occurrences, degree of decline from historic extent, and degree of alteration of natural processes affecting the dynamics, composition, or function of the type. Ranks are customarily assigned by the various members of the Natural Heritage Programs and of the national, regional, and state offices of NatureServe. For a given community type, ranks are assigned at three declining hierarchical levels of geography, from global or rangewide (the Global Rank or GRANK), through national or country (the National Rank or NRANK), to state, province, or other subnational unit (the State Rank or SRANK). A numeric scalar of 1 to 5 is added, with 1 indicating critical imperilment due to rarity, endemism, and/or threats, and 5 indicating little or no risk of extirpation or elimination. For example, a rank of G1 indicates critical imperilment on a rangewide basis, i.e. a great risk of "extinction" of the type worldwide; S1 indicates critical imperilment within a specific state, province, or other subnational jurisdiction, i.e. a great risk of extirpation of the type from the subnation.

When detailed information is available, two primary ranking factors are used in assessing the appropriate conservation status rank for a community element: (1) the total number of occurrences and (2) the total area (acreage) of the element. Secondary ranking factors such as the geographic range over which the element occurs, the threats to the occurrences, and the viability of the extant occurrences also affect the rank.

Although community ranking is best done when information on all the factors listed above is available, it is often necessary to establish preliminary ranks when this information is lacking or incomplete. This is particularly true for communities that have not been well described. In practice, four main factors have been useful in arriving at a preliminary assessment of a community's rangewide (global) rank:

1. The geographic range over which the type occurs.
2. The long term decline of the type across this range.
3. The degree of site specificity exhibited by the type.
4. The rarity across the range based on state ranks assigned by state Natural Heritage Programs.

Most of the ranks currently applied to USNVC types are based on such preliminary assessments of rarity.

Imperiled community types (and species), those ranked G1 through G3, are often regarded as the principal targets for conservation action, although NatureServe is dedicated to the conservation of all native community types. Special attention is generally given to taxa of high endangerment, as opportunities for their conservation may be limited in space and time. However, some highly ranked community types may be essentially secure because of their occurrence in areas that are remote from human alteration, that already have high degrees of protection, or that are unsuitable as human habitat. Others are essentially secure because of their intrinsic resistance to alteration or degradation. The conservation status of highly ranked communities should be assessed and steps should be taken to ensure their adequate protection.

More common and less imperiled community types, those ranked G4 and G5, are also conservation priorities. In most parts of the world, these more common community types have generally been highly altered and degraded by human action, and have often also been fragmented and their functioning impaired. For the conservation of many rare and common species, these relatively secure communities are of critical importance. In North America, a large tract of a common vegetation type in pristine condition that occurs in an essentially intact landscape with relatively intact ecological processes is of high priority for conservation. Though the type itself is common, large, high quality examples are rare and the opportunity to conserve such an example may be very limited. Generally, the conservation of lower ranked community types should be focused on examples in especially good condition, of large extent, with high landscape integrity/connectivity, and with ancillary conservation benefits. Because a primary purpose of the USNVC is to help set conservation priorities for natural community types, the recognition and naming of units reflects their relative naturalness. There generally exists a strong correlation between naturalness and conservation priority.

The dynamic nature of vegetation presents some additional complications in the evaluation of the naturalness and conservation priority of community units. Early- and mid-seral vegetation may be readily classifiable as distinct in composition and physiognomy from later seral vegetation, but may be transient on the landscape. Transience makes this vegetation difficult to "track" or monitor over time and the conservation of seral sequences will generally be dependent on the conservation of large landscapes that contain a mosaic of seral stages.

Also, disturbances cannot be clearly and cleanly classified as "natural" or "anthropogenic". Some anthropogenic disturbances are similar enough to natural disturbances that the resulting successional communities cannot be clearly distinguished, while others may create unique and unprecedented communities that do not occur in the natural landscape.

We therefore have developed categories and a resulting ranking system for communities that go beyond those used for species conservation. The various ranks used for communities presented in this document are listed and briefly described in Table 2. For further information on ranking see Master (1991).

TABLE 2: Global Rank Definitions

GX	ELIMINATED throughout its range, with no restoration potential due to extinction of dominant or characteristic species.
GH	PRESUMED ELIMINATED (HISTORIC) throughout its range, with no or virtually no likelihood that it will be rediscovered, but with the potential for restoration (e.g., *Castanea dentata* Forest).
G1	CRITICALLY IMPERILED

Generally 5 or fewer occurrences and/or very few remaining acres or very vulnerable to elimination throughout its range due to other factor(s).

G2 IMPERILED
Generally 6-20 occurrences and/or few remaining acres or very vulnerable to elimination throughout its range due to other factor(s).

G3 VULNERABLE
Generally 21-100 occurrences. Either very rare and local throughout its range or found locally, even abundantly, within a restricted range or vulnerable to elimination throughout its range due to specific factors.

G4 APPARENTLY SECURE
Uncommon, but not rare (although it may be quite rare in parts of its range, especially at the periphery). Apparently not vulnerable in most of its range.

G5 SECURE
Common, widespread, and abundant (though it may be quite rare in parts of its range, especially at the periphery). Not vulnerable in most of its range.

GU UNRANKABLE
Status cannot be determined at this time.

G? UNRANKED
Status has not yet been assessed.

GC PLANTED/CULTIVATED
Vegetation which has been planted in its current location by humans and/or is treated with annual tillage, a modified conservation tillage, or other intensive management or manipulation.

GW INVASIVE EXOTIC
Vegetation dominated by invasive alien species.

GD RUDERAL
Vegetation resulting from succession following anthropogenic disturbance of an area.

GM MODIFIED
Vegetation resulting from the management or modification of natural vegetation, it is readily restorable by management or time, and/or the restoration of ecological processes.

Modifiers and Rank Ranges

? A question mark added to a rank expresses an uncertainty about the rank in the range of 1 either way on the 1-5 scale. For example a G2? rank indicates that the rank is thought to be a G2, but could be a G1 or a G3.

G#G# Greater uncertainty about a rank is expressed by indicating the full range of ranks which may be appropriate. For example, a G1G3 rank indicates the rank could be a G1, G2, or a G3.

Q A "Q" added to a rank denotes questionable taxonomy. It modifies the degree of imperilment and is *only* used in cases where the type would have a *less imperiled* rank, if it were not recognized as a valid type (i.e., if it were combined with a more common type). A GUQ rank often indicates that the type is unrankable *because of* daunting taxonomic/definitional questions.

APPLICATIONS OF THE USNVC BY U.S.D.A. FOREST SERVICE AND OTHER FEDERAL AGENCIES OF THE UNITED STATES

The USNVC is increasingly used by the federal agencies (including Forest Service, Fish and Wildlife Service, Dept. of Defense, National Park Service, Bureau of Land Management, USGS Biological Resources Division, Environmental Protection Agency, and others), and The Nature Conservancy as a fundamental basis for ecosystem management, natural resource planning, and land management. The various lower hierarchical levels of the USNVC, particularly the alliance and the association, have particularly appropriate uses.

The **U.S. Forest Service**, a long-time user and supporter of this classification effort, is using the alliance level to describe the existing and potential vegetation for the ecoregional provinces, sections, and subsections in the Eastern and Southern Regions (Keys *et al*. 1995). This information is used for determining management and conservation goals. Other potential uses include using the alliance to characterize stand types in forest inventory or to characterize the habitats of wildlife species, including neotropical migrant birds, other birds, and other vertebrate animals. Alliances could easily be aggregated into the USFS "old growth types" or used to map dominant vegetation cover.

The association level is being used to by the Forest Service to describe and classify existing and potential natural vegetation. Individual National Forests throughout the country are using the community associations in the USNVC to conduct inventories of natural plant communities. The conservation status information contained within the USNVC can be used to rank the imperilment status of ecosystems and communities and to assess the conservation needs for both rare and representative community types on National Forest lands. Since rare species are linked to associations in the USNVC, associations can easily be used to help characterize the habitats and habitat needs of Proposed, Endangered, Threatened, and Sensitive (PETS) species. As part of the Forest planning process, the associations can be used to set priorities for representation in Research Natural Areas (RNA) and Special Interest Areas (SIA). Associations can also be used to develop management prescriptions, for prescribed fire, thinning, and other land management and restoration activities.

The **USGS BRD Gap Analysis Program** uses the alliance level of the USNVC to map vegetation using TM satellite imagery on a state level. As a requirement of this program he imagery must be classified at the alliance level, and those states that have not mapped to the alliance level must describe the relationship between their classification units and the alliance units.

The **U.S. Fish and Wildlife Service** is interested in applying the same classification and mapping standards as the NBS/NPS Vegetation Mapping Program for the wildlife refuge system. The Service believes that identifying vegetation communities throughout the National Wildlife Refuge System will improve the management of the System's fish and wildlife resources. Natural community inventories using the USNVC are currently underway on many refuges.

As part of the National Park Service Inventory and Monitoring Program, the **USGS BRD/NPS Vegetation Mapping Program** is currently involved in a long-term project to map the vegetation of all National Park units using the standard classification. This program requires the mapping of vegetation according to the classification, using a minimum mapping unit of 0.5 hectare (about 1 acre) mapped to a standard 1:24,000 scale USGS topographic quadrangle. Alliances or plant associations must be assigned to each vegetation polygon delineated. All vegetation maps, associated vegetation plot data, and accuracy assessment points are geographically referenced and made available in digital form that is GIS compatible.

As part of an assessment of the status of biodiversity, the **Environmental Protection Agency** has sponsored reviews of natural communities in both the Great Lakes region (TNC, Great Lakes Program 1994) and Great Plains (Ostlie *et al*. 1996). The Great Plains review contributed to a thorough review of the identification and status of all natural communities throughout the Great Plains. Follow-up surveys in specific landscapes are being planned. In addition, the agency has sponsored the Midwest Oak Ecosystems Recovery Plan (Leach and Ross 1995), which uses the structure of this classification to define the Midwest oak savanna and woodland types.

Structure and Format of this Report

The descriptions in this report may vary widely in length and level of detail. Some vegetation types are well studied, and well documented; while others are poorly known with little or no published material available. Ecological dynamics, disturbance regimes and successional processes of some vegetation types have also been studied and documented, but for others this sort of information is scanty. The user will find some descriptions to be fairly comprehensive and complete, and others to be missing pieces of information. As part of the USNVC, these descriptions are dynamic and are continuously changing and improving as more information becomes available. In its current form, we consider the classification complete and accurate enough to be usable for the full variety of possible potential applications, and that use will inevitably result in revisions, modifications, and enhancements.

All scientific names for vascular species in the report follow that of Kartesz (1999). Nomenclature for nonvascular plants follows Anderson (1990), Anderson *et al.* (1990), Egan (1987, 1989, 1990), Esslinger and Egan (1995), and Stotler and Crandall-Stotler (1977).

The main body of this report is presented in two sections, both containing vegetation descriptions for the area of interest. The first contains information on associations and the second includes information on alliances.

FORMAT OF ALLIANCE DESCRIPTIONS

The Table of Contents includes an index to alliance descriptions found in this report. The first level of this index is the Class, while the second and third level show the Formation and Alliance. The Formation Code (e.g. I.A. 8.N.b.) shows the position of the alliance within the physiognomic portion of the national classification hierarchy. The Alliance Code (e.g. I.A.8.N.b.14) includes the Formation Code plus a one to three digit counter that is assigned by the national classification database. Additionally listed is an Alliance Key (e.g. A.127), which is a unique identifier assigned to each alliance in the national classification.

Alliance descriptions are arranged in the hierarchical order of the national classification, with alliances in the same formation listed in order of their alliance codes.

Each alliance description is divided into sections and fields of information reported from the national classification database. Figure 3 presents the format of an alliance description with a description of the information contained in each field or section, including caveats about the data in that field or section.

FIGURE 3: Alliance Description Content

Formation
Alliance Code - Scientific Name of the Alliance (Nomenclature follows Kartesz 1999) – (**Alliance Key)**
Translated Name (Common) of the Alliance -

ALLIANCE CONCEPT

Summary: Description of the conceptual borders of the alliance in terms of vegetation composition and structure, expected geographic distribution, and expected environmental factors such as characteristic landscape position, rock type, soil texture, hydrology, etc..

Related Concepts: A list of common synonyms for the alliance from other vegetation or natural community classifications. An exhaustive survey for all possible other names for individual alliances has not been completed. Synonymy is usually provided to the Society of American Foresters (SAF) classification of forest cover types (Eyre 1980), as well as to the first TNC Southeast Regional Ecological Community Classification (Allard 1990). Synonymy to state Heritage Program classifications is also sometimes given, but this synonymy is not fully populated. The synonym is followed by the short citation for the author of the synonym. There often follows a comment on the relationship of the alliance to its synonym ("In part" is the most common comment). "In part" is used to describe a relationship in which the alliance and its synonym overlap to some degree but are not equivalent. Full citations are provided in the Bibliography at the end of this report.

Classification Comments: Text description of any classification questions for the alliance that may not have been addressed in other fields. This includes comments on relationships between similar alliances, comments on the level of documentation for the alliance, discussion of classification problems of individual associations, and reporting of physiognomic variability of the alliance that may affect it's placement in the hierarchy.

ALLIANCE DISTRIBUTION

Range: Text description of the alliance's known or suspected range of distribution. This may be reported by broad geographic regions or a list of states and provinces. A state, province, or country shown without a "?" indicates that the alliance is documented to occur there, or is very likely to occur there. A "?" indicates that the distribution is uncertain or speculative -- the uncertainty often relates to taxonomic questions about the circumscription of the alliance, but sometimes is simply the result of lack of information. For most alliances, this listing is intended to be (and should be) comprehensive. For some alliances, particularly those that are peripheral to our region from north, west, or south (tropical), the listing may only represent partial information, generally biased towards political units or ecoregions in close proximity to our area of concern. Note that a state, may be mentioned in the alliance distribution, but not for any of its associations (see below); this generally indicates that other associations remain to be described in the alliance.

Subnations: A listing of states or provinces where associations in this alliance have been defined. A state, province, or country shown without a "?" indicates that the alliance is documented to occur there, or is very likely to occur there. A "?" indicates that the distribution is uncertain or speculative.

TNC Ecoregions: The distribution of the alliance in ecoregions defined by TNC, with a level of confidence for the alliance's status in that ecoregion. Ecoregion codes from TNC are followed by a colon and letters that indicate confidence in the occurrence of an alliance in each ecoregion. Confidence levels are defined as follows: C = alliance occurrence is certain, P = alliance occurrence is probable, ? = alliance occurrence is possible. Ecoregions that are not listed for an alliance should not necessarily be taken to mean that the alliance absolutely does not occur there. Inventory efforts for many taxonomic groups of vegetation types, and in some geographic areas, are incomplete.

USFS Ecoregions: The distribution of the alliance at the ecoregion section level, with a level of confidence for the alliance's status in that ecoregion section. Ecoregion codes are from Keys et al. 1995. Ecological Units of the Eastern United States -- First approximation (map). A list ecoregion codes and names is included in an appendix at the end of this report. Each code is followed by a colon and letters that indicate confidence in the occurrence of an alliance in each section. Confidence levels are defined as follows: C = alliance occurrence is certain, P = alliance occurrence is probable, ? = alliance occurrence is possible. Sections that are not listed for an alliance should not necessarily be taken to mean that the alliance absolutely does not occur there. Inventory efforts for many taxonomic groups of vegetation types, and in some geographic areas, are incomplete.

Federal Lands: This field lists federal land units (such as National Park Service units, individual National Forests, etc.) within which the alliance occurs. This field is incompletely populated. The intent is to develop a comprehensive listing of the occurrence of vegetation types on the lands of important federal land-managing agencies, especially (in the Southeast) the U.S. Forest Service, Department of Defense, National Park Service, U.S. Fish and Wildlife Service, and Corps of Engineers. Because the field is in the process of being populated, the absence of a federal land management unit should not be considered to indicate that the type is absent on that unit, but the listing of a federal land management unit is generally a reliable indication of the type's likely occurrence there. The information is
currently most complete for U.S. Forest Service units, and for selected other units on which effort has been concentrated.

ALLIANCE SOURCES

References: References listed are those that have contributed directly to the concept of the alliance. It is by no means an exhaustive list of literature which deals with the alliance. The list of references is in a short citation format and the reader should consult the Bibliography at the back of the report for a full citation.

FORMAT OF ASSOCIATION DESCRIPTIONS

The hierarchical nature of the USNVC generally places structurally and compositionally related vegetation types (alliances and associations) near one another. Thus, the Forest Class (vegetation dominated by closed canopies of trees) is followed by the Woodland Class (vegetation dominated by open canopies of trees). All temperate pine forests will be found together in I.A. (Evergreen Forest subclass). Of course, such a linear ordering of types does not and cannot capture all relationships, and sometimes communities that are closely related ecologically are separated widely in the physiognomic hierarchy. For example, temperate live oak Woodlands are grouped together in II.C, separately from the temperate live oak Forests (I.C.). Similarly, related wetland communities, such as tidal flat communities may be found classed all across the hierarchy as Shrublands (III), Dwarf Shrublands (IV) or Herbaceous Vegetation (V).

For this reason, the association descriptions in this report have been organized into ecological groupings rather than following the hierarchical ordering of the upper levels of the USNVC. These groupings are not intended for use as a standard classification level, but are just a way of organizing the report. This ordering is intended to facilitate the use of this document by those unfamiliar with the USNVC hierarchy, by grouping ecologically related associations under a single heading. Additionally, ecological groups may provide another method for aggregating associations into higher level units for mapping or other management purposes.

The Table of Contents includes a index to association descriptions organized by Ecological Groups. The associations are then listed within each group. Within the main body of this report, the ecological group is printed at the beginning of each associations.

Each association description is divided into sections and fields of information reported from the national classification database. Figure 2 presents the format of an association description with a description of the information contained in each field or section, including caveats about the data in that field or section.

FIGURE 2: Association Description Content

COMMON NAME OF ASSOCIATION

ELEMENT IDENTIFIERS

NVC association: The scientific name (Global name) of the association based on Latin names of dominant or characteristic plant species. The standard name used in the USNVC. (nomenclature follows Kartesz 1999).

Database Code: Element Code (ELCODE). The database code used to identify the association in the national community database (BCD).

Formation: The lowest physiognomic level of the national classification hierarchy. The formation represents a grouping of community types that share a definite physiognomy or structure and broadly defined environmental factors, such as elevation and hydrologic regime.

Alliance: Alliance scientific name based on the Latin names of the dominant or characteristic plant species, followed by the alliance code from the national community database (BCD).

ELEMENT CONCEPT

Summary: A short description of the association including information on physiognomy, landscape setting, dominant species, range, primary environmental characteristics, and any other unique or noteworthy characteristics.

Environment: A description of the most important environmental determinants of the biological composition or structure of this association and/or its subtypes.

Vegetation: Vegetation attributes of the association including species richness, diversity, physiognomic structure, spatial distribution of vegetation, strata height, dominant life-forms, coverage of unvegetated substrate, and additional compositional comments.
Dynamics: Important natural disturbance regimes, successional status, and temporal dynamics for the association.
Similar Associations: Closely related or similar communities which make classification difficult, with comments on how they differ.
Related Concepts:. A list of common synonyms for the association from other vegetation or natural community classifications and the scientific literature. An exhaustive survey for all possible other names for individual associations has not been completed. Synonymy is usually provided to the Society of American Foresters (SAF) classification of forest cover types (Eyre 1980), as well as to the first TNC Southeast Regional Ecological Community Classification (Allard 1990). Synonymy is also given to names used in the scientific literature, especially when that literature has been used as a primary source for development of the taxonomic unit and its description. Synonymy to state Heritage Program classifications is given in the element distribution section (below).The synonym is followed by the short citation for the author of the synonym. Full citations are provided in the Bibliography at the end of this report.
Classification Comments: Additional comments about the association, including comments about classification criteria used to define the association, outstanding classification issues, comments on relationships between similar associations, comments on the level of documentation for the association, comments about the variability among occurrences of the association.

CONSERVATION RANKING & RARE SPECIES
GRank: The Global Element Rank which characterizes the relative rarity or endangerment of the association world-wide and the reason for assigning the Global Element Rank, such as number of occurrences, number of hectares, total area reduction from original, threats, degradation, etc.
High-ranked species: Latin names of high-ranking (G3 or higher) plant species expected to be found within occurrences of this association.

ELEMENT DISTRIBUTION
Range: Description of the association's present range.
Subnations: A listing of states or provinces where the associations are thought to occur. A state, province, or country shown without a "?" indicates that the association is documented to occur there, or is very likely to occur there. A "?" indicates that the distribution is uncertain or speculative.
USFS Ecoregions: The distribution of the association by USFS Ecoregions. Ecoregion codes are from Keys et al. 1995. Ecological Units of the Eastern United States -- First approximation (map) and are listed to as fine a level as possible (Province, Section, Subsection). A list of ecoregion codes and names is included in an appendix at the end of this report. Each code is followed by a colon and letters that indicate confidence in the occurrence of an association at each mapping level. Confidence levels are defined as follows: C = association occurrence is certain, P = association occurrence is probable, ? = association is possible. Ecoregions that are not listed for an association should not necessarily be taken to mean that the association absolutely does not occur there. Inventory efforts for many taxonomic groups of vegetation types, and in some geographic areas, are incomplete.
Federal Lands: This field lists federal land units (such as National Park Service units, individual National Forests, etc.) within which the association occurs. Federal units where an association is predicted to occur, but on which it has not been documented, are marked with a question mark (?). This field is incompletely populated. The intent is to develop a comprehensive listing of the occurrence of vegetation types on the lands of important federal land-managing agencies, especially (in the Southeast) the U.S. Forest Service, Department of Defense, National Park Service, U.S. Fish and Wildlife Service, and Corps of Engineers. Because the field is in the process of being populated, the absence of a federal land management unit should not be considered to indicate that the type is absent on that unit, but the listing of a federal land management unit is generally a reliable indication of the type's likely occurrence there. The information is currently most complete for U.S. Forest Service units, and for selected other units on which effort has been concentrated.

ELEMENT SOURCES
References: This is a listing (by no means complete at this time) of literature which deals with the association. References listed are those that have contributed directly to its development. The list of references is in a short citation format and the reader should consult the Bibliography at the back of this report for a full citation.

The final section of this report includes a bibliography of references relevant to the alliances and associations included herein.

Comments regarding the content of the classification are welcomed and encouraged. Please submit comments and suggestions to the authors at the following address: NatureServe, Southern U.S. Office; 6114 Fayetteville Road Suite 109, Durham, NC 27713; or by electronic mail to: Milo Pyne: milo_pyne@natureserve.org.

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ALLIANCES BY US NATIONAL VEGETATION CLASSIFICATION HIERARCHY

I. Forest

I.A.8.C.x. Planted/cultivated temperate or subpolar needle-leaved evergreen forest

I.A.8.C.X. *PINUS TAEDA* PLANTED FOREST ALLIANCE (A.99) LOBLOLLY PINE PLANTED FOREST ALLIANCE

ALLIANCE CONCEPT

Summary: This alliance represents young, monospecific plantation stands of *Pinus taeda*. These are cultivated forests and are not considered natural or near-natural vegetation. They are plantations in the strictest sense, typically managed under a regime in which most of the characteristics and attributes of a natural forest are absent. The core concept of these stands are those which support dense, often perfect rows of planted *Pinus taeda* or otherwise dense, young, stands which are managed and maintained for the extraction of forest products, especially pulpwood. In most cases these stands support almost no other tree species in the overstory, and typically very little understory. This association rarely exceeds 20-40 years of age and, with more intensive management, these rotation may be shortened even further. Stands are typically established with artificial regeneration, often using genetically improved tree stock. Excluded from this alliance are former plantation stands which have "broken up" with age or management to approximate a more natural structure and composition. Dense planting in rows, if successful, tends to result in nearly complete canopy closure which persists until the stand has either been regenerated or transitions into a different association. Herbaceous ground cover of any kind tends to be sparse due to reduction during site preparation, the typically dense canopy cover, and to the fact that many young plantations are infrequently burned at best.

Related Concepts:

- *Pinus taeda / Rhus copallina* planted forest alliance (Hoagland 1998a) ?
- Loblolly Pine: 81 (Eyre 1980) I

Classification Comments: None

ALLIANCE DISTRIBUTION

Range: This alliance is found in Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, and possibly Virginia.

Subnations: AL, AR, FL, GA, KY, LA, MD, MS, NC, OK, SC, TN, TX, VA?

TNC Ecoregions: 38:C, 39:C, 40:C, 41:C, 42:P, 43:C, 44:C, 50:C, 51:C, 52:C, 53:C, 56:P, 57:C, 58:P

USFS Ecoregions: 221Jb:CCC, 222C:CC, 222E:CC, 231Aa:CCC, 231B:CC, 231Ca:CPP, 231Cd:CPP, 231E:CC, 232Bm:CCC, 232Br:CCC, 232Ca:CCC, 232Cb:CCC, 232Ce:CCC, 234A:CC, M221D:CC, M222A:CC, M231A:CC

Federal Lands: DOD (Arnold, Fort Benning, Fort Bragg, Fort Gordon, Fort Stewart); DOE (Savannah River Site); USFS (Angelina, Bankhead?, Bienville, Cherokee, Conecuh, Croatan, Davy Crockett, De Soto, Delta, Francis Marion, Holly Springs, Kisatchie, Land Between the Lakes, Oconee, Ouachita, Ozark, Sabine NF, Sam Houston, St. Francis?, Sumter, Talladega, Tombigbee, Tuskegee); USFWS (Eufaula)

ALLIANCE SOURCES

References: Eyre 1980, Farnum et al. 1983, Hoagland 1998a, Hunter 1990, Moorhead et al. 1998, Ursic 1963

I.A.8.C.X. *PINUS VIRGINIANA* PLANTED FOREST ALLIANCE (A.100) VIRGINIA PINE PLANTED FOREST ALLIANCE

ALLIANCE CONCEPT

Summary: This alliance includes planted stands of *Pinus virginiana* with little understory, but they may have admixtures of other native or off-site pines (e.g., *Pinus echinata, Pinus strobus, Pinus taeda*). These are cultivated forests and are not considered natural or near-natural vegetation. They are maintained as plantations for the harvest of forest products. Stands have suffered some damage from the Southern Pine Beetle (*Dendroctonus frontalis*). Stands are planted in the Inner Coastal Plain for Christmas tree production.

Related Concepts:

- Virginia Pine: 79 (Eyre 1980) I

Classification Comments: *Pinus virginiana* is planted for pulpwood and lumber in the southeastern United States. It is also planted for production of Christmas trees and on strip-mined sites. Stands have suffered some damage from the Southern Pine Beetle (*Dendroctonus frontalis*).

ALLIANCE DISTRIBUTION

Range: This alliance is found throughout the Piedmont of the southeastern United States and ranges into parts of the Cumberland Plateau, Interior Low Plateau, Inner Coastal Plain, and the Southern Blue Ridge. It is known to occur in Alabama, Georgia, Kentucky, North Carolina, South Carolina, Tennessee, Virginia, and may possibly range into Mississippi.
Subnations: AL, GA, KY, MS?, NC, SC, TN, VA
TNC Ecoregions: 43:C, 44:P, 50:C, 51:C, 52:C
USFS Ecoregions: 221Hc:CCC, 221He:CCC, 222Eb:CCC, 231B:CC, 232:?, M221Dc:CC?, M221Dd:CC?
Federal Lands: DOD (Arnold, Fort Gordon, Fort Stewart?); USFS (Chattahoochee, Cherokee, Daniel Boone, Land Between the Lakes?, Nantahala?, Pisgah?, Uwharrie?)

ALLIANCE SOURCES

References: Burns and Honkala 1990a, Eyre 1980
I.A.8.N.b. Rounded-crowned temperate or subpolar needle-leaved evergreen forest

I.A.8.N.B. *PINUS TAEDA* FOREST ALLIANCE (A.130)
LOBLOLLY PINE FOREST ALLIANCE

ALLIANCE CONCEPT

Summary: This alliance includes both successional forests, following cropping or site conversion, and natural forests in the Piedmont, Cumberlands and Ridge and Valley, and Coastal Plain of the southeastern United States. Other canopy and subcanopy species that may be present in successional stands are *Liriodendron tulipifera, Acer rubrum, Liquidambar styraciflua, Pinus virginiana, Juniperus virginiana var. virginiana, Quercus stellata, Quercus velutina, Ulmus rubra, Quercus alba, Nyssa sylvatica, Ulmus alata, Cornus florida, Prunus serotina var. serotina*, and *Carya* spp. *Vaccinium* spp., especially *Vaccinium stamineum*, are common in these forests. One association in this alliance occurs on barrier islands in the Mid-Atlantic Coastal Plain. Along with the dominant *Pinus taeda*, canopy associates often include *Quercus falcata, Acer rubrum, Prunus serotina var. serotina*, and *Sassafras albidum*. The tall-shrub layer is comprised of *Morella cerifera (= Myrica cerifera)* and *Vaccinium formosum*. Vines and lianas are always present in abundance; *Vitis rotundifolia* is most commonly present, but *Toxicodendron radicans, Smilax rotundifolia, Smilax glauca*, and *Parthenocissus quinquefolia* are usually present in abundance as well. The herbaceous layer may be sparse, particularly if shrubs and vines are dense, but *Chasmanthium laxum* may be fairly abundant in this community. Other herbs include *Panicum amarum var. amarulum, Eupatorium hyssopifolium*, and *Elephantopus nudatus*. In southern Virginia and North Carolina, *Quercus virginiana* and *Gelsemium sempervirens* may also be present, but *Quercus virginiana* is never abundant and when present is usually restricted to the understory. *Pinus taeda* may occur rarely in the Ouachita Mountains and Ozarks of Arkansas where the species is becoming naturalized, expanding from its native range in the Coastal Plain, where it naturally occurs in low, moist areas (e.g., deep, well-drained soils of floodplains). However, a natural *Pinus taeda* forest association is not recognized for the Ozark or Ouachita region.

Related Concepts:
- Loblolly Pine: 81 (Eyre 1980) I
- Lowland Pine - Oak Forest (Foti 1994b) ?
- T1A9bII2a. *Pinus taeda* (Foti et al. 1994) ?
- Upland Mixed Forest (FNAI 1992a) ?
- Upland Mixed Forest, Gumbo Loblolly Forest subtype (FNAI 1992b) ?

Classification Comments: On the Bankhead National Forest in the Cumberland Plateau of northern Alabama, this alliance includes streamside terraces that are presumed to have been previously farmed. Associations occurring as plantations are classed in *Pinus taeda* Planted Forest Alliance (A.99).

ALLIANCE DISTRIBUTION

Range: This alliance is found in the Cumberland Plateau, Piedmont and Coastal Plains of the southeastern United States, from Delaware and Maryland south and west to Texas, and in the interior to Tennessee and possibly West Virginia.
Subnations: AL, AR, DE, FL, GA, LA, MD, MS, NC, NJ, OK, SC, TN, TX, VA
TNC Ecoregions: 31:P, 39:C, 40:C, 41:C, 42:P, 43:C, 44:C, 50:C, 52:C, 53:C, 55:?, 56:C, 57:C, 58:C, 59:C, 62:C
USFS Ecoregions: 221D:CC, 221Jb:CCC, 222Cb:CCC, 222Dc:CCC, 222Dd:CCC, 222Eb:CCC, 222Ec:CCC, 222Eg:CCC, 231Aa:CCC, 231Ab:CCC, 231Ac:CCC, 231Ad:CCC, 231Ae:CCC, 231Af:CCC, 231Ag:CCC, 231Ah:CCC, 231Ai:CCC, 231Aj:CCC, 231Ak:CCC, 231Al:CCC, 231Am:CCC, 231An:CCC, 231Ao:CCP, 231Ba:CCC, 231Bb:CCP, 231Bc:CCP, 231Bd:CCC, 231Be:CCP, 231Bf:CCP, 231Bg:CCP, 231Bh:CCP, 231Bi:CCP, 231Bj:CCP, 231Bk:CCP, 231Bl:CC?, 231Ca:CCP, 231Cb:CCP, 231Cc:CCP, 231Cd:CCC, 231Ce:CCC, 231Cf:CCC, 231Cg:CCP, 231Da:CCP, 231Dc:CCC, 231De:CC?, 231Ea:CCC, 231Eb:CC?, 231Ec:CC?, 231Ed:CC?, 231Ef:CC?, 231Eg:CCP, 231Eh:CCC, 231Ei:CC?, 231Ej:CC?, 231Ek:CCP, 231En:CC?, 231Fa:CPP, 231Fb:CP?, 232Ac:CCC, 232Ba:CCC, 232Bb:CC?, 232Bc:CC?, 232Bd:CC?, 232Be:CC?, 232Bg:CCC, 232Bh:CC?, 232Bi:CC?, 232Bj:CCC, 232Bk:CC?, 232Bl:CC?, 232Bm:CCC, 232Bn:CC?, 232Bo:CC?, 232Bp:CC?, 232Bq:CCC, 232Br:CCC, 232Bt:CC?, 232Bu:CC?, 232Bv:CC?, 232Bx:CC?, 232Bz:CCC, 232Ca:CCC, 232Cb:CCC, 232Cc:CC?, 232Ce:CCC, 232Cf:CC?, 232Cg:CC?, 232Ci:CC?, 232Da:CC?, 232Dc:CCC, 232Fa:CC?, 232Fb:CC?, 232Fe:CCC, 255Da:PPP, M221D:??

Federal Lands: DOD (Arnold, Fort Benning, Fort Gordon); NPS (Assateague Island, Cape Hatteras, Chickamauga-Chattanooga, Cowpens, Fort Donelson, Guilford Courthouse, Kennesaw Mountain, Kings Mountain, Little River Canyon?, Ninety Six, Shiloh?); TVA (Tellico); USFS (Angelina, Apalachicola, Bankhead, Bienville, Chattahoochee, Conecuh, Croatan, Davy Crockett, Kisatchie, Land Between the Lakes?, Oconee, Sabine NF, Sam Houston, Sumter, Talladega, Tuskegee, Uwharrie); USFWS (Chincoteague)

ALLIANCE SOURCES

References: Cain and Shelton 1994, Eyre 1980, FNAI 1992a, FNAI 1992b, Felix et al. 1983, Foti 1994b, Foti et al. 1994, Martin and Smith 1991, Martin and Smith 1993

I.A.8.N.B. *PINUS VIRGINIANA* FOREST ALLIANCE (A.131)
VIRGINIA PINE FOREST ALLIANCE

ALLIANCE CONCEPT

Summary: This alliance includes forests dominated by *Pinus virginiana* and occurring in the Piedmont from Pennsylvania south to Alabama, and ranging west into the Appalachians, Ridge and Valley, the Cumberland Plateau, and in scattered locales of the Interior Low Plateau. Forests in this alliance may have admixtures of *Pinus taeda*, *Pinus echinata*, *Pinus pungens*, and/or *Pinus rigida*. These other species, if present, can have canopy coverage between 1 and 50%. Other associated species vary with the geographic distribution of the alliance. In many associations, a dense ericaceous shrub stratum is typical. This alliance includes both early successional forests resulting from natural or anthropogenic disturbance and natural forests in edaphically extreme situations. Typically, *Pinus virginiana* communities are short-lived as a forest and are more common as woodland communities [see II.C.3.N.a *Pinus (rigida, pungens, virginiana) - Quercus prinus* Woodland Alliance (A.677)]. Associated species vary with the geographic distribution of the alliance.

Related Concepts:

- Appalachian pine-oak forest (Evans 1991) I
- IA7a. Xeric Shortleaf Pine - Oak Forest (Allard 1990) I
- Pine--Oak/Heath (Nelson 1986) I
- Pine--Oak/Heath (Schafale and Weakley 1990) I
- Virginia Pine - Mixed Oaks HR (Pyne 1994) ?
- Virginia Pine CUPL, BR, RV (Pyne 1994) ?
- Virginia Pine: 79 (Eyre 1980) I

Classification Comments: Appalachian pine-dominated associations need to be revisited in relation to the ecology of shortleaf pine, *Pinus echinata*. Are some stands of this type ones that historically were dominated by shortleaf pine? (MP 2002-03).

ALLIANCE DISTRIBUTION

Range: Forests in this alliance are possible in the Piedmont from Pennsylvania south to Alabama, and ranging west into the Appalachians, Ridge and Valley, the Cumberland Plateau, and in scattered locales of the Interior Low Plateau. The range of the alliance includes parts of Alabama, Delaware, Georgia, Kentucky, New Jersey, North Carolina, South Carolina, Tennessee, Maryland, Pennsylvania, West Virginia, Virginia, Ohio, and Indiana.

Subnations: AL, GA, IN, KY, MD, NC, NJ, OH, PA, SC, TN, VA, WV

TNC Ecoregions: 43:C, 44:C, 49:C, 50:C, 51:C, 52:C, 58:P, 59:C, 61:C

USFS Ecoregions: 221Da:CCP, 221Db:CCC, 221Ea:CC?, 221Eb:CCC, 221Ec:CCC, 221Ed:CCP, 221Ef:CCC, 221Eg:CCC, 221Ha:CCC, 221Hb:CCC, 221Hc:CCC, 221He:CCC, 221Ja:CCC, 221Jb:CCC, 221Jc:CCC, 222Da:CCC, 222Dc:CCC, 222Dd:CCC, 222Dg:CCC, 222Dj:CCC, 222Eb:CCC, 222Eg:CCC, 222Eh:CCC, 222Ej:CCC, 222El:CCC, 222En:CCC, 222Eo:CCC, 222Fc:CCC, 222Fd:CCC, 222Ff:CCC, 231Aa:CCC, 231Ab:CCC, 231Ac:CCP, 231Ad:CCC, 231Ae:CCC, 231Af:CCP, 231Ag:CCP, 231Ah:CCP, 231Ai:CCP, 231Aj:CCP, 231Ak:CCP, 231Al:CCP, 231Am:CCP, 231An:CCP, 231Ao:CCP, 231Ap:CCP, 231Bc:CCC, 231Ca:CCP, 231Cb:CCP, 231Cc:CCP, 231Cd:CCC, 231Ce:CCP, 231Cf:CCP, 231Cg:CCP, 231Da:CCC, 231Dc:CCC, M221Aa:CCC, M221Ab:CCC, M221Ac:CCC, M221Ba:CC?, M221Bd:CCP, M221Be:CCP, M221Ca:CCP, M221Cb:CCP, M221Cc:CCC, M221Cd:CCC, M221Ce:CCC, M221Da:CCC, M221Db:CCC, M221Dc:CCC, M221Dd:CCC

Federal Lands: DOD (Fort Jackson); NPS (Blue Ridge Parkway?, Chickamauga-Chattanooga, Great Smoky Mountains, Kennesaw Mountain, Kings Mountain, Little River Canyon?, Mammoth Cave, Shiloh); TVA (Land Between the Lakes?, Tellico); USFS (Bankhead, Chattahoochee, Cherokee, Daniel Boone, George Washington, Jefferson, Nantahala, Oconee, Pisgah, Sumter, Talladega, Uwharrie?)

ALLIANCE SOURCES

References: Allard 1990, Andreu and Tukman 1995, Barden 1977, Burns and Honkala 1990a, Chapman 1957, Cooper 1963, Evans 1991, Eyre 1980, Faber-Langendoen et al. 1996, Frothingham et al. 1926, Gettman 1974, Malter 1977, Nelson 1986, Pyne 1994, Racine 1966, Schafale and Weakley 1990, Whittaker 1956

I.B.2.C.x. Planted/cultivated cold-deciduous forest

I.B.2.C.X. *TAXODIUM DISTICHUM* PLANTED FOREST ALLIANCE (A.212)
BALD-CYPRESS PLANTED FOREST ALLIANCE

ALLIANCE CONCEPT

Summary: Plantations of *Taxodium distichum*, grown for timber.
Related Concepts: No information
Classification Comments: Stands are planted at Land Between the Lakes, Tennessee, Kentucky?

ALLIANCE DISTRIBUTION

Range: This alliance is found in North Carolina and possibly other southern states.
Subnations: NC, TN
TNC Ecoregions: 44:C, 52:C, 57:C
USFS Ecoregions: 222:C, 231A:CC, 232:C
Federal Lands: USFS (Land Between the Lakes)

ALLIANCE SOURCES

References: No information

I.B.2.N.a. Lowland or submontane cold-deciduous forest

I.B.2.N.A. *FAGUS GRANDIFOLIA - QUERCUS RUBRA - QUERCUS ALBA* FOREST ALLIANCE (A.229)
AMERICAN BEECH - NORTHERN RED OAK - WHITE OAK FOREST ALLIANCE

ALLIANCE CONCEPT

Summary: Forests in this alliance occur in non-montane or low-elevation montane mesic situations and are dominated by *Fagus grandifolia* typically with some combination of *Quercus rubra* and/or *Quercus alba*. Associated canopy and subcanopy species can include *Liriodendron tulipifera, Acer saccharum, Magnolia tripetala, Magnolia acuminata* (Ozarks), *Tilia americana var. americana* (Ozarks), *Tilia americana var. heterophylla, Quercus muehlenbergii, Acer rubrum, Cornus florida, Ostrya virginiana, Aesculus sylvatica*, and *Ilex opaca*. Some of these forests, particularly in the Piedmont of South Carolina, the southern Ridge and Valley of Alabama, or in Arkansas, may contain *Acer barbatum* instead of *Acer saccharum*. Shrubs in this alliance include *Vaccinium stamineum, Viburnum rafinesquianum, Euonymus americana*, and, in some occurrences, *Kalmia latifolia*. The herb layer can be relatively lush with such species as *Polystichum acrostichoides, Galium circaezans, Hexastylis arifolia, Hexastylis minor, Desmodium nudiflorum, Erythronium umbilicatum ssp. umbilicatum, Hepatica nobilis var. obtusa, Epifagus virginiana, Tiarella cordifolia var. collina, Trillium* spp., *Heuchera americana, Stellaria pubera, Podophyllum peltatum, Botrychium virginianum*, and others present. These forests often occur on concave and sheltered landforms such as north-facing slopes, low slopes, high terraces along streams, and possibly other situations. The core concept of the range of this alliance includes areas inland from the Coastal Plain, as *Quercus rubra* is absent from large areas of the Coastal Plain (as in North Carolina). Forests in this alliance occur in the Cumberlands and Southern Ridge and Valley, Piedmont and Interior Low Plateau, and on protected slopes and ravines in the Ozarks, central Ouachita Mountains, and Arkansas Valley.

Related Concepts:

- Appalachian mesophytic forest (Evans 1991) I
- Beech - Sugar Maple: 60 (Eyre 1980) I
- Beech RV (Pyne 1994) ?
- Coastal Forest/Woodland (Swain and Kearsley 2001) ?
- IA5g. Typic Mesic Piedmont Forest (Allard 1990) I
- Maritime Oak - Holly Forest / Woodland (Swain and Kearsley 2001) ?
- Mesic Mixed Hardwood Forest, Piedmont Subtype (Schafale and Weakley 1990) ?
- Mixed Mesophytic Forest (Foti 1994b) I
- Northern Red Oak: 55 (Eyre 1980) I
- Piedmont Mesic Broad-leaved Deciduous Forest (Ambrose 1990a) ?
- T1B4aI1a. *Fagus grandifolia - Magnolia tripetala* (Foti et al. 1994) ?
- T1B4aI1b. *Fagus grandifolia - Acer saccharum - Quercus* spp. (*alba, muehlenbergii, rubra*) (Foti et al. 1994) ?

Classification Comments: The relationship between this alliance and I.B.2.N.a *Fagus grandifolia - Quercus alba* Forest Alliance (A.228) needs to be clarified. There may be some problems with assignment of associations where *Quercus rubra* does, in fact, enter the Coastal Plain, as in parts of Virginia, Alabama, and western Georgia. Vegetation from this alliance is known from Ozark and Ouachita national forests RNAs (Roaring Branch and Dismal Hollow) and occurs on the Shoal Creek District of the Talladega National Forest. One association, the "Piedmont American Beech Heath Bluff" (CEGL004539) ranges peripherally into the Coastal Plain (ECO57).

ALLIANCE DISTRIBUTION

Range: The core concept of the range of this alliance includes areas inland from the Coastal Plain, as *Quercus rubra* is absent from large areas of this region. Forests in this alliance occur in the Cumberlands and Southern Ridge and Valley, Piedmont, and Interior Low Plateau, and on protected slopes and ravines in the Ozarks, central Ouachita Mountains, and Arkansas Valley. This alliance is known from the states of Alabama, Arkansas, Delaware, Georgia, Kentucky, Massachusetts, Maryland, North Carolina, New Jersey, New York, Ohio, Oklahoma, Pennsylvania, Rhode Island, South Carolina, Tennessee, Virginia, and West Virginia. It may possibly occur in southern Indiana and Connecticut.

Subnations: AL, AR, CT, DE, GA, IN?, KY, MA, MD, MS, NC, NJ, NY, OK, PA, RI, SC, TN, VA, WV

TNC Ecoregions: 38:C, 39:C, 43:C, 44:C, 49:C, 50:C, 51:C, 52:C, 57:C, 58:C, 61:C, 62:C

USFS Ecoregions: 221Ab:CCC, 221Ac:CCC, 221Ad:CCC, 221Ae:CCP, 221Am:CCC, 221Da:CPC, 221Dc:CPP, 221Ea:CCC, 221Ef:CCP, 221Eg:CCP, 221Ha:CCC, 221Hc:CCP, 221Hd:CCP, 221He:CCC, 221Ja:CCP, 221Jb:CC?, 221Jc:CCP, 222Ab:CCC, 222Ag:CCC, 222An:CCC, 222Cb:CC?, 222Cc:CC?, 222Cd:CC?, 222Ce:CC?, 222Cf:CC?, 222Cg:CC?, 222Da:CCP, 222Db:CCP, 222Dc:CCP, 222Dd:CCP, 222De:CCP, 222Dg:CC?, 222Di:CC?, 222Dj:CC?, 222Ea:CCC, 222Eb:CCC, 222Ec:CC?, 222Ee:CCP, 222Ef:CCP, 222Eg:CCC, 222Eh:CCP, 222Ei:CCP, 222Ej:CCP, 222Ek:CCP, 222Em:CCP, 222En:CCP, 222Eo:CCP, 222F:CC, 231Aa:CCC, 231Ab:CCC, 231Ac:CCC, 231Ad:CCC, 231Ae:CCC, 231Af:CCC, 231Ag:CCC, 231Ah:CCC, 231Ai:CCC, 231Aj:CCC, 231Ak:CCP, 231Am:CCP, 231An:CCC, 231Ao:CCC, 231Ba:C??, 231Bb:C??, 231Be:C??, 231Bg:C??, 231Bh:C??, 231Bi:C??, 231Bk:C??, 231Ca:CCP, 231Cb:CCP, 231Cc:CCP, 231Cd:CCC, 231Ce:CCP, 231Cf:CCP, 231Cg:CCP, 231Da:CCC, 231Db:CCC, 231Dc:CCC, 231Dd:CCC, 231Gb:CCC, 232Aa:CCC, 232Ab:CCC, 232Ac:CCC, 232Ad:CCC, 232Br:CCC, 232Bt:CCC, 232Bx:CCP, 232Bz:CCC, 232C:CC, 234Ab:PPP, M221Dd:CCC, M222Aa:CCC, M222Ab:CCC, M231Aa:CCC, M231Ab:CCC, M231Ac:CCC

Federal Lands: COE (Falls Lake, Jordan Lake, Kerr Reservoir); DOD (Fort Benning, Fort Dix); NPS (Buffalo, Cape Cod, Fort Donelson, Guilford Courthouse, Little River Canyon?, Mammoth Cave, Morristown, Ninety Six, Rock Creek, Shiloh, Thomas Stone); TVA (Land Between the Lakes, Tellico); USFS (Bankhead, Bienville?, Chattahoochee, Cherokee?, Conecuh, Daniel Boone, Homochitto, Jefferson?, Oconee?, Ouachita, Ozark, St. Francis, Sumter, Talladega, Tuskegee, Uwharrie); USFWS (Great Swamp, Lake Isom)

ALLIANCE SOURCES

References: Allard 1990, Ambrose 1990a, Evans 1991, Eyre 1980, Faber-Langendoen et al. 1996, Foti 1994b, Foti et al. 1994, Golden 1979, Jones 1988a, Jones 1988b, Martin and Smith 1991, Pyne 1994, Schafale and Weakley 1990, Swain and Kearsley 2001, USFS 1990

I.B.2.N.A. *FAGUS GRANDIFOLIA - ACER SACCHARUM - (LIRIODENDRON TULIPIFERA)* FOREST ALLIANCE (A.227)
AMERICAN BEECH - SUGAR MAPLE - (TULIPTREE) FOREST ALLIANCE

ALLIANCE CONCEPT

Summary: This alliance is composed of rich, mesic forests of the east-central United States and southern Canada. The southern range of this alliance is limited by the distribution of *Acer saccharum* which is largely absent from the Coastal Plain. The forest canopy and subcanopy are typically dominated by *Acer saccharum* and *Fagus grandifolia*, although *Liriodendron tulipifera* may be an important canopy component in some parts of the range. Other common trees include *Carpinus caroliniana, Carya* spp., *Fraxinus americana, Ostrya virginiana, Quercus rubra, Tilia americana*, and *Ulmus americana*. In the southern part of this alliance's range, additional species may include *Quercus alba, Tilia americana, Liquidambar styraciflua, Aesculus glabra, Nyssa sylvatica*, and *Carya cordiformis*. Shrubs are usually rare in northern stands but become more abundant in southern stands. *Asimina triloba* and *Lindera benzoin* (in the southern parts of this alliance's range), *Diervilla lonicera, Euonymus obovata*, and *Sambucus* spp. (in the northern parts), *Morus rubra*, and *Corylus americana* are typical shrubs. The herbaceous layer is well-developed. The most abundant species include *Adiantum pedatum, Arisaema triphyllum, Claytonia virginica, Dicentra canadensis, Dryopteris intermedia, Galium aparine, Maianthemum canadense* (in the north), *Maianthemum racemosum, Menispermum canadense, Osmorhiza claytonii, Phegopteris hexagonoptera* (in the south), *Podophyllum peltatum, Polygonatum biflorum, Sanguinaria canadensis, Trillium grandiflorum*, and *Viola* spp.

Stands of this alliance are found on flat, rolling, or, in the south, dissected topography. South of the limit of glaciation there is an increasing tendency for this alliance to be found on north- or east-facing slopes. The soils are fertile well-drained, silt, silt loam, sandy loam, or loam. Those in the north have formed over glacial till almost exclusively, while stands south of the limit of Wisconsin glaciation may form from till, alluvium, sandstone, or shale.

Related Concepts:

- *Acer/Fagus/Liriodendron/Quercus* (Pyne 1994) ?
- *Fagus grandifolia - Acer saccharum - Podophyllum peltatum* association (Pell and Mack 1977) ?
- Acidic mesophytic forest (Evans 1991) I
- Beech - Maple association (Braun 1950) ?

- Beech - Sugar Maple: 60 (Eyre 1980) I
- Coastal Plain mesophytic cane forest (Evans 1991) ?
- Deep soil mesophytic forest (Evans 1991) I
- Dry-Mesic Acidic Central Forest (Smith 1991) ?
- Eastern Broadleaf Forests: 102: Beech-Maple Forest (*Fagus-Acer*) (Kuchler 1964) ?
- IA5d. Typic Mesophytic Forest (Allard 1990) ?
- Mesic Central Forest (Smith 1991) ?
- Mixed Mesophytic Forest (Foti 1994b) I
- Sugar Maple-Beech-Tulip Poplar HR (Pyne 1994) ?
- T1B4aI1c. *Fagus grandifolia - Acer* spp. (*rubrum, saccharum*) - *Liriodendron tulipifera* (Foti et al. 1994) ?
- Tuliptree - beech - maple forest (Fike 1999) ?
- Western Mesophytic Forest Region (Braun 1950) I

Classification Comments: At the southern limit of this alliance's distribution (e.g., in the Cumberland Plateau of Alabama), the sugar maple in the stands, if present, may be *Acer barbatum* and/or *Acer leucoderme*, not *Acer saccharum.*

ALLIANCE DISTRIBUTION

Range: This alliance is found in southern Michigan, Ohio, Indiana, Illinois, eastern Missouri, Kentucky, Tennessee, Alabama, Pennsylvania, New York, West Virginia, and possibly Arkansas (?), Maryland (?), and Virginia (?). It is also found in Canada in southern Ontario.

Subnations: AL, AR?, CT, GA, IL, IN, KY, MD, MI, MO, MS, NY, OH, ON, PA, SC, TN, VA, WV

TNC Ecoregions: 36:C, 38:C, 42:C, 43:C, 44:C, 45:C, 48:C, 49:C, 50:C, 52:C, 57:C, 58:C, 59:C, 61:C

USFS Ecoregions: 212Fa:PP?, 212Fb:PPP, 212Ga:PPP, 221D:CC, 221Ea:CCC, 221Eb:CCC, 221Ec:CCC, 221Ed:CCC, 221Ef:CCC, 221Eg:CCC, 221Fa:CCC, 221Fb:CCC, 221Fc:CCC, 221Ha:CCP, 221Hb:CCC, 221He:CCP, 221I:CP, 221J:CC, 222Ak:CP?, 222Ao:CPP, 222Aq:CPP, 222Ca:CCP, 222Cb:CCC, 222Cc:CCC, 222Cg:CCC, 222Ch:CCP, 222Da:CCC, 222Db:CCC, 222Dc:CCC, 222De:CCC, 222Df:CCC, 222Dg:CCC, 222Dh:CCP, 222Di:CCC, 222Eb:CCC, 222Eg:CCC, 222Eh:CCC, 222Ei:CCC, 222Ek:CCC, 222El:CCC, 222Em:CCC, 222En:CCP, 222Eo:CCC, 222Fa:CCP, 222Fb:CCC, 222Fc:CCC, 222Fd:CCC, 222Fe:CCC, 222Ff:CCC, 222Ga:CCC, 222Gc:CCC, 222Gd:CCC, 222Ha:CCC, 222Hb:CCC, 222Hc:CCC, 222Hd:CCC, 222Hf:CCC, 222Ia:CC?, 222Ib:CC?, 222Ic:CC?, 222Id:CCP, 222If:CCC, 222Ja:CCC, 222Jb:CCC, 222Jc:CCC, 222Jd:CCC, 222Jg:CCC, 222Jh:CCC, 222Ji:CCC, 222Jj:CCC, 222Kj:CCC, 231Ac:CCP, 231Ae:CCC, 231Af:CCC, 231Ah:CCP, 231Ai:CCP, 231Ba:CC?, 231Bb:CC?, 231Bc:CCP, 231Bd:CCP, 231Be:CCP, 231Bf:CC?, 231Bh:CCP, 231Bk:CCP, 231Cd:CCC, 232Br:CCC, 234Ab:CCC, 234Ac:CCC, 234An:CCP, 251De:CCC, M221Aa:CC?, M221Ab:CCP, M221Ac:CCC, M221Ad:CCP, M221Ba:CCC, M221Bb:CCC, M221C:C?, M221Da:CPP

Federal Lands: NPS (Colonial, Little River Canyon?, Shiloh); TVA (Land Between the Lakes, Tellico); USFS (Bankhead, Chattahoochee?, Cherokee?, Daniel Boone, Jefferson, Talladega, Tuskegee)

ALLIANCE SOURCES

References: Allard 1990, Andreu and Tukman 1995, Braun 1950, Cobbe 1943, Dodge and Harman 1985, Evans 1991, Eyre 1980, Faber-Langendoen et al. 1996, Fike 1999, Foti 1994b, Foti et al. 1994, Kuchler 1964, Martin 1975, Muller 1982, Pell and Mack 1977, Pyne 1994, Rogers 1981, Schmalzer 1978, Schmalzer and DeSelm 1982, Schmalzer et al. 1978, Smith 1991

I.B.2.N.A. *QUERCUS PRINUS - (QUERCUS COCCINEA, QUERCUS VELUTINA)* FOREST ALLIANCE (A.248)
ROCK CHESTNUT OAK - (SCARLET OAK, BLACK OAK) FOREST ALLIANCE

ALLIANCE CONCEPT

Summary: This alliance includes xeric oak forests strongly dominated by *Quercus prinus* or *Quercus prinus* with admixtures of *Quercus coccinea* and/or *Quercus velutina*, occurring in the southern and central Appalachians, Ridge and Valley, Cumberland Plateau, Piedmont, Interior Low Plateau, and possibly in the northern Appalachians. In the Piedmont and Ridge and Valley, and in areas transitional to these provinces, *Quercus stellata* and *Quercus marilandica* may be canopy associates. Other canopy/subcanopy associates include *Acer rubrum, Amelanchier arborea, Carya alba, Carya glabra, Cornus florida, Hamamelis virginiana, Magnolia fraseri, Nyssa sylvatica, Oxydendrum arboreum, Pinus rigida, Pinus strobus, Quercus alba, Quercus rubra, Robinia pseudoacacia*, and *Sassafras albidum*. In the Appalachians, a dense ericaceous shrub layer is characteristic, with species such as *Gaylussacia baccata, Gaylussacia ursina, Kalmia latifolia, Leucothoe recurva, Rhododendron maximum, Vaccinium pallidum*, and *Vaccinium stamineum*. In the upper Piedmont *Kalmia latifolia, Vaccinium arboreum*, and *Vaccinium pallidum* are common. In the montane distribution of this alliance, forests of this alliance have replaced forests formerly dominated or codominated by *Castanea dentata*, and chestnut sprouts are common in the understory. Other shrub species found in forests of this alliance include *Chionanthus virginicus, Diospyros virginiana, Robinia hispida, Sassafras albidum, Styrax grandifolius, Symplocos tinctoria, Viburnum acerifolium, Viburnum prunifolium*, and *Viburnum rufidulum*. Herbaceous cover is typically sparse in these dry, rocky forests and species vary with geographic location. Some typical herbaceous species include *Antennaria plantaginifolia, Aureolaria laevigata, Chamaelirium luteum, Chimaphila maculata, Danthonia spicata, Dichanthelium commutatum, Dichanthelium dichotomum,*

Dioscorea quaternata, Epigaea repens, Galax urceolata, Galium latifolium, Gaultheria procumbens, Goodyera pubescens, Hieracium venosum, Lysimachia quadrifolia, Medeola virginiana, Monotropa uniflora, Potentilla canadensis, Pteridium aquilinum, Stenanthium gramineum, Uvularia puberula, and *Uvularia sessilifolia*. These forests occur on convex, upper slopes and ridgetops, south-facing slopes, over thin, rocky, infertile soils in the Appalachians, typically below 3500 feet (1066 m), where windthrow and ice damage are common natural disturbances. In the Piedmont these forests occur on low mountains and hills, on rocky, well-drained, acidic soils, sometimes associated with outcrops of quartzite, or other resistant rock.

Related Concepts:

- *Quercus prinus - Quercus velutina / Vaccinium stamineum* Association (Fleming and Moorhead 1996) ?
- Appalachian sub-xeric forest (Evans 1991) I
- Chestnut Oak Forest (Schafale and Weakley 1990) I
- Chestnut Oak: 44 (Eyre 1980) I
- Dry oak - heath forest (Fike 1999) ?
- IA6d. Chestnut Oak Slope and Ridge Forest (Allard 1990) ?
- IA7d. Piedmont Monadnock Forest (Allard 1990) ?
- Mixed Oak Forest (Swain and Kearsley 2001) ?
- Oligotrophic Forest (Rawinski 1992) I
- Piedmont Monadnock Forests (Schafale and Weakley 1990) I
- Ridgetop Chestnut Oak (Swain and Kearsley 2001) ?
- Xeric Central Hardwood Forest (Smith 1991) ?

Classification Comments: None

ALLIANCE DISTRIBUTION

Range: This alliance occurs in the southern and central Appalachians, Ridge and Valley, Cumberland Plateau, Piedmont, Interior Low Plateau, and possibly in the northern Appalachians. It is found in Illinois, Indiana, Ohio, Connecticut, Delaware, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, Virginia, Alabama, Georgia, Kentucky, North Carolina, South Carolina, and Tennessee, and possibly Maine (?), Maryland (?), Mississippi (?), and West Virginia (?).

Subnations: AL, CT, DE, GA, IL, IN, KY, MA, MD, ME, NC, NH, NJ, NY, OH, PA, RI, SC, TN, VA, VT, WV

TNC Ecoregions: 38:C, 43:P, 44:C, 45:C, 48:C, 49:C, 50:C, 51:C, 52:C, 59:C, 60:C, 61:C, 63:C, 64:C

USFS Ecoregions: 212Ec:CCC, 212Fa:CCP, 212Fb:CCC, 212Fc:CCC, 212Fd:CCC, 212Ga:CCC, 212Gb:CCC, 221Aa:CC?, 221Ac:CCP, 221Ad:CCP, 221Ae:CCC, 221Af:CCC, 221Ag:CCC, 221Ah:CCC, 221Ai:CCP, 221Aj:CCP, 221Ak:CCP, 221Al:CC?, 221Am:CCC, 221Ba:CCC, 221Bb:CCC, 221Bc:CCC, 221Bd:CCC, 221Da:CCC, 221Db:CCP, 221Dc:CCC, 221Ea:CCC, 221Eb:CCC, 221Ec:CCC, 221Ed:CCC, 221Ee:CCC, 221Ef:CCC, 221Eg:CCC, 221Fa:CCC, 221Fb:CCP, 221Hc:CC?, 221I:CP, 221Ja:CCP, 221Jb:CCC, 221Jc:CCP, 222Aq:CCC, 222Cf:CCP, 222Cg:CCP, 222Da:CCP, 222Db:CCC, 222Dc:CCP, 222De:CCC, 222Dg:CCP, 222Dh:CCP, 222Dj:CCP, 222Eb:CCC, 222Eg:CCC, 222Ei:CCC, 222Ek:CCP, 222El:CCC, 222Em:CCC, 222Eo:CCC, 222Fd:CCC, 222Hb:CCC, 231Aa:CCP, 231Ad:CCC, 231Ae:CCC, 231Af:CCC, 231Ag:CCC, 231Aj:CCC, 231Ak:CCC, 231Al:CCC, 231Am:CCP, 231An:CCP, 231Ao:CCP, 231Ap:CCP, 231Be:CPP, 231Cd:CCC, 231Dc:CCC, 232Aa:PPP, 232Ac:PPP, 232Ad:PPP, 232Ba:PP?, 232Bc:PP?, 232Bd:PPP, 232Br:PPP, 232Ch:PPP, M212Ba:CPP, M212Bb:CPP, M212Ca:CCC, M212Cb:CCC, M212Cc:CCC, M212Cd:CCP, M212De:CCC, M212Ea:CCC, M212Eb:CCP, M221Aa:CCC, M221Ab:CCC, M221Ac:CCC, M221Ad:CCC, M221Ba:CCC, M221Bb:CCC, M221Bc:CCC, M221Bd:CCC, M221Be:CCC, M221Bf:CCC, M221Ca:CPP, M221Cb:CPP, M221Cc:CPP, M221Cd:CPP, M221Ce:CPP, M221Da:CCC, M221Db:CCC, M221Dc:CCC, M221Dd:CCC

Federal Lands: DOD (Fort Knox); NPS (Blue Ridge Parkway?, Carl Sandburg Home, Chickamauga-Chattanooga, Great Smoky Mountains, Harpers Ferry, Kings Mountain, Little River Canyon?, Rock Creek, Russell Cave); TVA (Land Between the Lakes, Tellico); USFS (Bankhead, Chattahoochee, Cherokee, Daniel Boone, George Washington, Jefferson, Nantahala, Oconee?, Pisgah, Sumter, Talladega?, Uwharrie)

ALLIANCE SOURCES

References: Allard 1990, Arends 1981, Callaway et al. 1987, Cooper 1963, DuMond 1970, Evans 1991, Eyre 1980, Faber-Langendoen et al. 1996, Fike 1999, Fleming and Moorhead 1996, Gibbon 1966, Golden 1974, Martin 1989, McLeod 1988, Mowbray 1966, Nelson 1986, Newell and Peet 1996a, Patterson 1994, Peet and Christensen 1980, Rawinski 1992, Rawinski et al. 1996, Schafale and Weakley 1990, Schmalzer 1978, Smith 1991, Swain and Kearsley 2001, Tobe et al. 1992, Wells 1974, Wheat 1986, Whittaker 1956

I.B.2.N.A. *QUERCUS PRINUS - QUERCUS (ALBA, FALCATA, RUBRA, VELUTINA)* FOREST ALLIANCE (A.249)
ROCK CHESTNUT OAK - (WHITE OAK, SOUTHERN RED OAK, NORTHERN RED OAK, BLACK OAK) FOREST ALLIANCE

ALLIANCE CONCEPT

Summary: Dry-mesic to mesic forests dominated by *Quercus prinus* occurring in admixture with other *Quercus* species, in the Blue Ridge, Piedmont, Ridge and Valley, Cumberland Plateau, and the Interior Low Plateau. *Quercus prinus* is the leading dominant in

these forests, but other common canopy species can include *Quercus alba, Quercus coccinea, Quercus falcata, Quercus rubra, Quercus velutina, Acer rubrum, Carya alba, Carya glabra, Carya ovalis, Carya ovata, Carya pallida, Fagus grandifolia, Liriodendron tulipifera, Nyssa sylvatica*, and *Pinus strobus*. The subcanopy often contains *Cornus florida* and *Oxydendrum arboreum*. Drier examples can contain *Juniperus virginiana var. virginiana*. Other common species in the subcanopy/shrub stratum include *Acer rubrum, Carya glabra, Cercis canadensis, Hamamelis virginiana, Kalmia latifolia, Nyssa sylvatica, Rhododendron calendulaceum, Rhododendron maximum, Robinia pseudoacacia, Stewartia ovata, Symplocos tinctoria, Vaccinium stamineum*, and *Viburnum acerifolium*. The ground flora varies depending on available light, moisture, and soil nutrients but can be quite diverse, especially in associations with sparse shrub cover. Herbaceous species characteristic of these dry-mesic to mesic oak - hickory forests include *Symphyotrichum cordifolium (= Aster cordifolius), Symphyotrichum retroflexum (= Aster curtisii), Eurybia macrophylla (= Aster macrophyllus), Symphyotrichum undulatum (= Aster undulatus), Botrychium virginianum, Carex nigromarginata, Chimaphila maculata, Actaea racemosa (= Cimicifuga racemosa), Collinsonia canadensis, Coreopsis major, Cypripedium parviflorum var. pubescens (= Cypripedium pubescens), Danthonia compressa, Danthonia spicata, Dioscorea villosa, Epigaea repens, Eupatorium album, Eupatorium purpureum, Galax urceolata, Galium triflorum, Houstonia purpurea (= Hedyotis purpurea), Hieracium venosum, Iris cristata, Maianthemum racemosum, Medeola virginiana, Melanthium parviflorum, Polystichum acrostichoides, Prenanthes altissima, Pycnanthemum incanum, Scutellaria ovata, Tephrosia virginiana, Uvularia perfoliata*, and *Uvularia puberula*. Vines are common and species that may be present include *Parthenocissus quinquefolia, Smilax* spp., and *Toxicodendron radicans*. In the Cumberland Plateau, forests in this alliance have replaced forests once dominated by *Castanea dentata* and often have chestnut sprouts in the understory. Forests in this alliance are known from moderately sheltered low ridges, flats, and valleys at lower elevations (762-1036 m; 2500-3400 feet) in the Blue Ridge and from upper slopes, draws, and gorge slopes in the Cumberland Plateau, and from upper to middle, dry-mesic slopes in the Piedmont. This alliance provisionally includes forests over limestone in the lower portions of the Ridge and Valley.

Related Concepts:

- Chestnut Oak Slope and Ridge Forest (Wieland 1994b) ?
- Chestnut Oak: 44 (Eyre 1980) I
- Dry-Mesic Oak--Hickory Forest (Schafale and Weakley 1990) I
- Mesic Oak-Hickory Forest (Patterson 1994) ?
- Mixed Oak Cover Type (Thomas 1966) ?
- Mixed Oak, Yellow Poplar, Hickory (McLeod 1988) ?
- Oak-Hickory Cover Type (Thomas 1966) ?
- White Oak - Black Oak - Northern Red Oak: 52 (Eyre 1980) I

Classification Comments: None

ALLIANCE DISTRIBUTION

Range: This alliance is found in Alabama, Georgia (?), Kentucky, Mississippi (?), North Carolina, South Carolina, Tennessee, New Jersey, New York, Virginia, West Virginia, and Ohio. Forests in this alliance occur in the Blue Ridge, Piedmont, Ridge and Valley, Cumberland Plateau, and the Interior Low Plateau.

Subnations: AL, CT, GA?, KY, MD?, MS?, NC, NJ, NY, SC, TN, VA, WV?

TNC Ecoregions: 43:C, 44:C, 50:C, 51:C, 52:C, 59:C, 61:C, 62:C

USFS Ecoregions: 221Ha:CCC, 221Hb:CCC, 221Hc:CCC, 221Hd:CCP, 221He:CCP, 221Jb:CCC, 222Cc:CCP, 222Ce:CCP, 222Cf:CCP, 222Cg:CCP, 222Eb:CCC, 222Ec:CCC, 222Eg:CCC, 222Eo:CCC, 222Fd:CCC, 231Aa:CCP, 231Ac:CCP, 231Af:CCC, 231Ah:CCP, 231Ai:CCC, 231Bc:CCC, 231Bd:CCC, 231Be:CCC, 231Bk:CCC, 231Db:CCC, 232Aa:CCC, 232Ab:CCC, 232Ac:CCC, M221Aa:CCC, M221Ab:CCC, M221Ca:CCP, M221Cb:CCP, M221Cc:CCC, M221Cd:CCC, M221Ce:CCC, M221Da:CCC, M221Db:CCP, M221Dc:CCC, M221Dd:CCC

Federal Lands: DOE (Oak Ridge); NPS (Blue Ridge Parkway?, Chickamauga-Chattanooga, Kennesaw Mountain, Kings Mountain); TVA (Land Between the Lakes?, Tellico); USFS (Cherokee, Daniel Boone, George Washington, Holly Springs?, Jefferson, Nantahala, Oconee?, Pisgah, Sumter, Talladega, Uwharrie); USFWS (Mountain Longleaf?)

ALLIANCE SOURCES

References: Andreu and Tukman 1995, Eyre 1980, Fralish and Crooks 1989, Franklin et al. 1993, Golden 1979, Martin 1971, McLeod 1988, Nowacki and Abrams 1992, Patterson 1994, Schafale and Weakley 1990, Schmalzer 1978, Schmalzer and DeSelm 1982, Thomas 1966, Wells 1970c, Wells 1974, Wieland 1994b

I.B.2.N.A. *QUERCUS ALBA - (QUERCUS RUBRA, CARYA* SPP.) FOREST ALLIANCE (A.239) WHITE OAK - (NORTHERN RED OAK, HICKORY SPECIES) FOREST ALLIANCE

ALLIANCE CONCEPT

Summary: This alliance is widely distributed in the eastern United States and portions of adjacent Canada and includes dry mesic to mesic upland oak forests dominated by *Quercus alba* and/or *Quercus rubra*, with or without *Carya* species. Stands are 15-25 m tall, with a closed, deciduous canopy. The shrub and herbaceous strata are typically well-developed. *Quercus alba* usually dominates the stands, either alone or in combination with *Quercus rubra* (especially on moister sites) and sometimes *Quercus velutina* (especially on

drier sites). Some associations in this alliance are dominated by *Quercus rubra*, although *Quercus alba* is usually also a canopy component. *Carya* species (particularly *Carya alba, Carya glabra* or *Carya ovata*) are typically common either in the canopy or subcanopy. In the southeastern United States, this alliance covers dry-mesic forests of the Piedmont, low Appalachian Mountains, and the Cumberland and Interior Low Plateau, and mesic oak-hickory forests of the Blue Ridge and the interior highlands of the Ozarks and Ouachita Mountains. Associated species include *Carya glabra, Carya ovata, Carya alba, Fraxinus americana, Acer rubrum, Acer leucoderme, Cornus florida, Nyssa sylvatica, Ostrya virginiana, Calycanthus floridus, Pyrularia pubera, Tilia americana var. caroliniana, Oxydendrum arboreum*, and others. This alliance is found throughout the midwestern United States on moderately rich, upland sites. Typical associates include *Fraxinus americana, Ulmus americana, Tilia americana, Acer saccharum, Acer rubrum*, and more locally, *Quercus macrocarpa* and *Quercus ellipsoidalis.*

Stands are found on gentle to moderately steep slopes on uplands and on steep valley sides. The soils are moderately deep to deep and vary from silts to clays and loams. The parent material ranges from glaciated till to limestone, shale, sandstone and other bedrock types. In the midwestern United States, many stands are succeeding to types dominated by *Acer saccharum, Tilia americana, Acer rubrum*, and other mesic tree associates. This succession may be delayed by fire and grazing. In the eastern and southeastern United States, *Liriodendron tulipifera, Fraxinus americana, Acer rubrum*, and other mesic associates often increase after disturbances, such as clearcutting or windstorms, especially in the absence of fire.

Related Concepts:

- Acidic mesophytic forest (Evans 1991) I
- Basic Oak - Hickory Forest (Nelson 1986) ?
- Basic Oak--Hickory Forest, Mafic Substrate Variant (Schafale and Weakley 1990) I
- Calcareous mesophytic forest (Evans 1991) I
- Dry-Mesic Oak--Hickory Forest (Schafale and Weakley 1990) ?
- IA6j. Interior Calcareous Oak - Hickory Forest (Allard 1990) I
- Mesic Oak - Hickory Forest (Foti 1994b) I
- Montane Oak--Hickory Forest (Schafale and Weakley 1990) I
- Oak - Chestnut - Hickory Forest (Ambrose 1990a) I
- Oak - Hickory Forest (Swain and Kearsley 2001) ?
- Oak--Hickory Forest (Nelson 1986) I
- Permesotrophic Forest (Rawinski 1992) I
- Submesic broadleaf deciduous forest (Ambrose 1990a) I
- T1B4aIII. *Quercus rubra - Quercus* spp. (Foti et al. 1994) ?
- White Oak - Black Oak - Northern Red Oak: 52 (Eyre 1980) I
- White Oak: 53 (Eyre 1980) I

Classification Comments: None

ALLIANCE DISTRIBUTION

Range: This alliance ranges from Ontario, Canada, throughout the midwestern and eastern United States, south to the very northern edges of the Western and Eastern Gulf coastal plains.

Subnations: AL, AR, CT, DE, GA, IA, IL, IN, KS, KY, MA, MD, ME, MI, MN, MO, MS?, NC, NE, NH, NJ, NY, OH, OK, ON, PA, RI, SC, TN, VA, VT, WI, WV

TNC Ecoregions: 32:P, 35:C, 36:C, 37:C, 38:C, 39:C, 40:C, 43:C, 44:C, 45:C, 46:C, 47:C, 48:C, 49:C, 50:C, 51:C, 52:C, 53:?, 58:C, 59:C, 60:C, 61:C, 62:C, 64:C

USFS Ecoregions: 212Ec:CCC, 212Ed:CCC, 212Fb:CCP, 212Fc:CCC, 212Fd:CC?, 212Ga:CC?, 212Gb:CC?, 212Ht:CPP, 212Hx:CPP, 212Jj:C??, 212Ka:CC?, 212Kb:CCC, 212Mb:C??, 212Na:CCP, 212Nb:CC?, 212Nc:CCC, 212Nd:CC?, 221Ab:CCC, 221Ad:CCP, 221Ae:CCC, 221Af:CCC, 221Ag:CCC, 221Ah:CCC, 221Ai:CCC, 221Ak:CCC, 221Al:CCC, 221Am:CCC, 221Ba:CCC, 221Bb:CCC, 221Bd:CCC, 221Da:CCC, 221Db:CCC, 221Dc:CCC, 221Ea:CCC, 221Eb:CCC, 221Ec:CCC, 221Ed:CCC, 221Ee:CCC, 221Ef:CCC, 221Eg:CCC, 221Fa:CCC, 221Fb:CCP, 221Fc:CCC, 221Ha:CCC, 221Hb:CCC, 221Hc:CCC, 221Hd:CCC, 221He:CCC, 221Ja:CCP, 221Jb:CCC, 222Aa:CCC, 222Ab:CCC, 222Ac:CCC, 222Ad:CCC, 222Ae:CCC, 222Af:CCC, 222Ag:CCC, 222Ah:CCC, 222Aj:CCC, 222Ak:CCC, 222Al:CCP, 222Am:CCC, 222An:CCC, 222Ao:CCC, 222Ap:CCC, 222Aq:CCC, 222Cb:CCC, 222Cc:CCC, 222Cd:CCC, 222Ce:CCC, 222Cf:CCC, 222Cg:CCC, 222Ch:CCC, 222Da:CCP, 222Db:CCC, 222Dc:CCC, 222Dd:CCP, 222De:CCC, 222Df:CCC, 222Dg:CCP, 222Dh:CCC, 222Di:CCC, 222Dj:CCP, 222Ea:CCC, 222Eb:CCC, 222Ec:CCC, 222Ed:CCC, 222Ee:CCC, 222Ef:CCC, 222Eg:CCC, 222Eh:CCC, 222Ei:CCC, 222Ej:CCP, 222Ek:CCC, 222Em:CCC, 222En:CCC, 222Eo:CCC, 222Fa:CCP, 222Fb:CCC, 222Fd:CCC, 222Fe:CCC, 222Ff:CCC, 222Ga:CCC, 222Gb:CCC, 222Gc:CCC, 222Ha:CCC, 222Hb:CCC, 222Hf:CCC, 222Id:CCP, 222If:CCC, 222Ja:CCC, 222Jb:CCC, 222Jc:CCC, 222Jg:CCC, 222Jh:CCC, 222Ji:CCC, 222Jj:CCC, 222Ke:CCC, 222Kf:CCC, 222Kg:CCC, 222Kh:CCC, 222Kj:CCC, 222Lb:CCC, 222Lc:CCC, 222Le:CCC, 222Lf:CCC, 222Ma:CCC, 222Mb:CCC, 222Mc:CCC, 222Md:CCC, 222Me:CCC, 222Qb:CCC, 231Aa:CCC, 231Ab:CCC, 231Ac:CCC, 231Ad:CCC, 231Ae:CCC, 231Af:CCC, 231Ag:CCC, 231Ah:CCC, 231Ak:CCC, 231Al:CCC, 231Am:CCC, 231An:CCC, 231Ao:CCC, 231Ap:CCC, 231Ba:CCP, 231Bb:CCP, 231Bc:CCP, 231Bd:CCP, 231Be:CCC, 231Bg:CCP, 231Bh:CCP, 231Bk:CCP, 231Ca:CCC, 231Cb:CCC, 231Cc:CCC, 231Cd:CCC, 231Cf:CCC, 231Da:CCC, 231Dc:CCC,

231Dd:CCC, 231De:CCC, 231E:CC, 231Gb:CCC, 232Aa:CCC, 232Ac:CCP, 232Ad:CCC, 232Bq:CCC, 232Br:CCC, 232Bt:CCC, 232Bv:CCC, 232Bx:CCC, 232Ca:CCC, 232Cb:CCC, 234Ac:PPP, 251Aa:CCC, 251Ba:CCC, 251Be:CCC, 251Ca:CC?, 251Cb:CCC, 251Cc:CCC, 251Cd:CCC, 251Ce:CCC, 251Cf:CCC, 251Cg:CCC, 251Ch:CCC, 251Cj:CCC, 251Ck:CCC, 251Cn:CC?, 251Co:CC?, 251Cp:CCC, 251Cq:CCC, 251Dc:CCC, 251Dd:CCC, 251De:CCC, 251Df:CCC, 251Dh:CCP, 251Ea:CCC, M212Bd:CCC, M212Cb:CCC, M212Cc:CCC, M212Ea:CC?, M212Eb:CC?, M221Aa:CCC, M221Bd:C??, M221Cd:CCC, M221Da:CCC, M221Dc:CCC, M221Dd:CCC, M222Aa:CCC, M222Ab:CCC, M231Aa:CCC, M231Ab:CCC, M231Ac:CCC, M231Ad:CCC

Federal Lands: COE (Dale Hollow?); DOD (Arnold, Fort Benning); DOE (Oak Ridge); NPS (Blue Ridge Parkway?, Cape Cod, Carl Sandburg Home, Chickamauga-Chattanooga, Cowpens, Effigy Mounds, Fort Donelson, Great Smoky Mountains, Guilford Courthouse, Kennesaw Mountain, Kings Mountain, Little River Canyon?, Natchez Trace, Ninety Six, Russell Cave, Shenandoah, Shiloh); TVA (Tellico); USFS (Bankhead, Chattahoochee, Cherokee, Daniel Boone, George Washington, Jefferson, Land Between the Lakes, Mark Twain, Nantahala, Oconee, Ouachita?, Ozark, Pisgah, Shawnee, St. Francis, Sumter, Uwharrie)

ALLIANCE SOURCES

References: Allard 1990, Ambrose 1990a, Andreu and Tukman 1995, Evans 1991, Eyre 1980, Faber-Langendoen et al. 1996, Foti 1994b, Foti et al. 1994, Fountain and Sweeney 1985, Fralish 1988b, Fralish et al. 1991, Golden 1979, Hoagland 1997, Jones 1988a, Jones 1988b, McLeod 1988, Monk et al. 1990, Nelson 1986, Oakley et al. 1995, Oosting 1942, Rawinski 1992, Robertson et al. 1984, Schafale and Weakley 1990, Swain and Kearsley 2001, Wharton 1978

I.B.2.N.A. *QUERCUS ALBA - QUERCUS (FALCATA, STELLATA)* FOREST ALLIANCE (A.241) WHITE OAK - (SOUTHERN RED OAK, POST OAK) FOREST ALLIANCE

ALLIANCE CONCEPT

Summary: This alliance contains vegetation that can be described as dry oak and oak-hickory forests. These are usually dominated by a mixture of *Quercus alba* and *Quercus falcata*; *Quercus stellata* may be dominant or codominant. In addition, *Quercus coccinea, Quercus velutina, Quercus marilandica, Carya alba, Carya glabra, Carya pallida, Carya carolinae-septentrionalis, Carya ovata,* and *Fraxinus americana* often are present. Common subcanopy and shrub species include *Oxydendrum arboreum, Acer rubrum, Ulmus alata, Juniperus virginiana var. virginiana, Vaccinium arboreum, Cornus florida, Sassafras albidum, Gaylussacia frondosa (= var. frondosa), Gaylussacia baccata, Vaccinium pallidum,* and *Vaccinium stamineum*. Herbaceous species that may be present include *Chimaphila maculata, Polystichum acrostichoides, Asplenium platyneuron, Hexastylis arifolia, Coreopsis major, Tephrosia virginiana, Sanicula canadensis, Desmodium nudiflorum, Desmodium nuttallii, Symphyotrichum urophyllum*? (= *Aster sagittifolius*?), *Symphyotrichum patens (= Aster patens), Solidago ulmifolia,* and *Hieracium venosum.* These often are successional forests following logging and/or agricultural cropping (and possibly also chestnut blight in the southern Appalachians). Some examples occur in upland flats and have been called xerohydric because they occasionally will have standing water in the winter due to a perched water table, but are droughty by the end of the growing season. Other occurrences are found on well-drained sandy loam or clay loam soils that are often, although not always, shallow. Karst topography can be found in areas where this alliance occurs. Soils are most often a well-drained sandy loam, although clay loams are not uncommon. Forests of this alliance may occupy narrow bands of dry-mesic habitat transitional between lower and midslope mesic communities and xeric ridgetops. This alliance is found in the Upper East Gulf Coastal Plain, Piedmont, low mountains (including Cumberlands, Ridge and Valley, and low parts of the Southern Blue Ridge), and Interior Low Plateau. Distribution in the Atlantic Coastal Plain, East Gulf Coastal Plain, and Upper West Gulf Coastal Plain needs assessment. In the Shawnee Hills, Knobs, Coastal Plain, and Appalachian Plateau regions of Kentucky, these forests form a common matrix vegetation over acid sandstone and shales. These Kentucky forests are dominated by *Quercus alba* with little or no *Quercus falcata* and occupy middle to upper slope positions. In the southern Illinois portion of the range, examples occur on south- to west-facing slopes where increased temperatures favor *Quercus falcata* over *Quercus rubra*.

Related Concepts:

- Acidic sub-xeric forest (Evans 1991) I
- Coastal Forest/Woodland (Swain and Kearsley 2001) ?
- Dry-Mesic Oak--Hickory Forest (Schafale and Weakley 1990) I
- Eastern Serpentine Barren (Smith 1991) I
- IA6i. Interior Upland Dry-Mesic Oak - Hickory Forest (Allard 1990) I
- Maritime Oak - Holly Forest / Woodland (Swain and Kearsley 2001) ?
- Post Oak-Black Hickory Series (Diamond 1993) ? Serpentine pitch pine - oak forest (Fike 1999) ?
- Southern Red Oak RV (Pyne 1994) ?
- Submesic Oak - Hickory Forest (Foti 1994b) I T1B4aIV. *Quercus falcata - Quercus* spp. (Foti et al. 1994) ?
- White Oak - Black Oak - Northern Red Oak: 52 (Eyre 1980) I Xerohydric flatwoods (Evans 1991) I

Classification Comments: None

ALLIANCE DISTRIBUTION

Range: This alliance is found in southern Illinois, Indiana (?), Kentucky, Tennessee, Arkansas, Louisiana (?), Oklahoma (?), Texas (?), Mississippi, Alabama, Georgia, South Carolina, North Carolina, Virginia, Delaware, Maryland, and New Jersey. This alliance is found in the Upper East Gulf Coastal Plain, Piedmont, low mountains, and Interior Low Plateau. Distribution in the Atlantic Coastal

Plain, East Gulf Coastal Plain, and Upper West Gulf Coastal Plain needs assessment. In the Shawnee Hills, Knobs, Coastal Plain, and Appalachian Plateau regions of Kentucky, these forests form a common matrix vegetation over acid sandstone and shales.
Subnations: AL, AR, CT, DE, GA, IL, IN?, KY, LA?, MA, MD, MO?, MS, NC, NJ, NY, OK?, SC, TN, TX?, VA
TNC Ecoregions: 32:P, 40:C, 41:P, 42:C, 43:C, 44:C, 50:C, 51:C, 52:C, 53:P, 56:C, 57:P, 58:C, 59:P, 61:C, 62:C
USFS Ecoregions: 221Ad:CPP, 221Dc:C??, 221Ha:CCP, 221Hc:CCC, 221Hd:CCP, 221He:CCP, 221Jb:CCC, 222Ca:CCP, 222Cb:CCC, 222Cc:CCP, 222Cd:CCP, 222Ce:CCP, 222Cf:CC?, 222Cg:CCC, 222Ch:CC?, 222Da:CCC, 222Dc:CCP, 222Dd:CCP, 222De:CCC, 222Df:CCP, 222Dg:CCC, 222Dh:CCC, 222Di:CCP, 222Dj:CCC, 222Ea:CCC, 222Eb:CCC, 222Ec:CCP, 222Ee:CCC, 222Ef:CCC, 222Eg:CCC, 222Eh:CCC, 222Ei:CCC, 222Ej:CCC, 222El:CCC, 222En:CCC, 231Aa:CCC, 231Ab:CCP, 231Ac:CCP, 231Ad:CCP, 231Ae:CCC, 231Af:CCC, 231Ag:CCC, 231Ah:CCP, 231Ai:CCC, 231Aj:CCP, 231Ak:CCC, 231Al:CCC, 231Am:CCC, 231An:CCC, 231Ao:CCC, 231Ap:CCC, 231Ba:CPP, 231Bc:CPP, 231Bd:CPP, 231Be:CP?, 231Ca:CCP, 231Cb:CCP, 231Cc:CCP, 231Cd:CCC, 231Ce:CCP, 231Cg:CCP, 231Da:CCC, 231Dc:CCC, 231De:CCC, 231Ea:CC?, 231Eb:CCC, 232Aa:CCC, 232Ab:CCC, 232Ac:CCC, 232Ad:CCP, 232Bl:CCP, 232Bm:CCP, 232Bn:CCP, 232Bq:CCC, 232Br:CCC, 232Bt:CCC, 232Bv:CCP, 232Bx:CCP, 232Bz:CCP, 232Ca:CP?, 232Ch:CP?, 232Fa:CP?, 234Aa:CC?, 234Ab:CCC, 234Ac:CCP, 234Ae:CCC, 234Ag:CC?, 234Ah:CCP, M221Aa:CC?, M221Ab:CCC, M221Da:CCC, M221Dd:CCC
Federal Lands: DOD (Arnold, Fort Benning, Fort Gordon); DOE (Oak Ridge); NPS (Big South Fork, Chickamauga-Chattanooga, Cowpens, Fire Island, Great Smoky Mountains, Guilford Courthouse, Kennesaw Mountain, Kings Mountain, Little River Canyon?, Ninety Six, Shiloh); TVA (Land Between the Lakes?, Tellico); USFS (Bankhead, Chattahoochee?, Cherokee, Daniel Boone, Holly Springs?, Kisatchie?, Oconee, Sabine NF?, Shawnee, St. Francis, Sumter, Talladega, Tombigbee?, Tuskegee?, Uwharrie); USFWS (Eufaula)

ALLIANCE SOURCES

References: Allard 1990, Andreu and Tukman 1995, Braun 1950, Diamond 1993, Evans 1991, Eyre 1980, Faber-Langendoen et al. 1996, Fike 1999, Foti 1994b, Foti et al. 1994, Fralish et al. 1991, Golden 1979, Oosting 1942, Peet and Christensen 1980, Pyne 1994, Robertson and Heikens 1994, Schafale and Weakley 1990, Smith 1991, Sneddon et al. 1996, Swain and Kearsley 2001, Voigt and Mohlenbrock 1964

V. Herbaceous Vegetation

V.A.5.N.a. Tall sod temperate grassland

V.A.5.N.A. *SCHIZACHYRIUM SCOPARIUM - SORGHASTRUM NUTANS* HERBACEOUS ALLIANCE (A.1198)
LITTLE BLUESTEM - YELLOW INDIANGRASS HERBACEOUS ALLIANCE

ALLIANCE CONCEPT

Summary: This alliance, comprising dry-mesic tallgrass vegetation and blackland prairies, is found in the central United States and southern Canada. The vegetation of stands of this alliance is characterized by moderate to dense cover of medium and tall grasses and a diverse mixture of forbs. Woody species are absent to rare but can be uncommon in some communities. The most abundant species across the range of this alliance are *Bouteloua curtipendula, Schizachyrium scoparium*, and *Sorghastrum nutans*. Other graminoids species common in parts of this alliance are *Andropogon gerardii, Bouteloua hirsuta, Carex* spp., *Danthonia spicata, Hesperostipa spartea (= Stipa spartea)*, and *Sporobolus heterolepis*. In the far southern part of the alliance's range, associations can contain *Andropogon glomeratus, Panicum virgatum*, and *Sporobolus clandestinus*. Some of the many forbs which can be found in this alliance include *Symphyotrichum ericoides (= Aster ericoides), Echinacea pallida, Helianthus* spp., *Hedyotis nigricans var. nigricans* (in Illinois and Missouri), *Lespedeza capitata* (especially on sand), *Lithospermum canescens, Clinopodium arkansanum (= Calamintha arkansana)* (in Illinois), and *Solidago nemoralis*. In the Southeast, *Ratibida pinnata* or *Baptisia australis var. minor* may be found, as well as a variety of forbs with Coastal Plain affinities. Woody species that are found in stands of this alliance are those that can adapt to the dry to dry-mesic conditions, such as *Acer rubrum* and *Juniperus virginiana*.

In the Southeast, this alliance includes a variety of relatively restricted communities which are rare and/or have been greatly reduced through land-use change. Many of these occur on distinctive soils or geologic formations, such as calcareous clays. This includes the Jackson Formation of Mississippi and Louisiana; the Cook Mountain Formation, Fleming Formation, and Morse Clays of Louisiana; the Demopolis and related formations of the Alabama Black Belt; as well as blackland prairies on Alfisols, Mollisols, and Vertisols in Texas, and isolated occurrences on the Catahoula Formation in eastern Texas. This alliance also occurs in the Coosa River valley of northwestern Georgia and northeastern Alabama and the Arbuckle Mountains of Oklahoma. This alliance includes remnant prairie-like vegetation occupying small areas (<1 acre) of mafic substrates in the Southern Blue Ridge plateau underlain by magnesium-rich bedrock; this vegetation is disjunct from the principal distribution of this alliance. Fire presumably played an important ecological role in maintaining natural stands of this vegetation in the presettlement landscape. Threats to these communities include fire suppression, livestock grazing, and damage by feral hogs and by vehicles.

Most stands of this alliance are found on gentle to moderately steep slopes, although stands on flat plains can occur (Curtis 1959, Nelson 1985). The most prevalent slope aspects are south or west. Soils range from shallow to deep and are well-drained to excessively well-drained (White and Madany 1978, Chapman 1984). Most are loams or sands, but some can be gravel or clay. These soils are formed from eolian or alluvial sand, limestone, dolomite, sandstone, glacial till, glacial outwash, chert, loess, or shale.

Related Concepts:

- *Dalea* Clayey Dry Blackland Prairies (Turner et al. 1999) ?
- *Schizachyrium - Sorghastrum - Andropogon* community type (Diamond and Smeins 1984) I
- *Schizachyrium - Sorghastrum - Andropogon* community type (Diamond and Smeins 1988) I
- *Schizachyrium scoparium-Helenium autumnale* calcareous clay prairie or barren (Wieland 1995) ?
- Bluestem Tallgrass Prairie (Pyne 1994) I
- Cook Mountain Calcareous Prairie (Smith 1996a) ?
- Hempstead Plains Grassland (Reschke 1990) ?
- ID4a. Bluestem Tallgrass Prairie (Allard 1990) I
- ID4b. Morse Clay Calcareous Prairie (Allard 1990) ?
- ID4c. Fleming Calcareous Prairie (Allard 1990) ? ID4c. Jackson Prairie (Allard 1990) ?
- ID4e. Cook Mountain Calcareous Prairie (Allard 1990) ?
- Jackson Calcareous Prairie (Smith 1996a) ?
- Keiffer Calcareous Prairie (Smith et al. 1989) ?
- Limestone prairie (Evans 1991) I
- Little Bluestem - Big Bluestem - Indiangrass Association (Diamond and Smeins 1990) ?
- Little Bluestem-Indiangrass Series (Diamond 1993) I
- Morse Clay Calcareous Prairie (Smith 1996a) ?
- Red Clay Prairie (Foti 1994b) ?
- Sandplain Grassland (Swain and Kearsley 2001) ?
- Sandstone prairie (Evans 1991) I T5A1aI1c. *Andropogon gerardii - Sorghastrum avenaceum* (Foti et al. 1994) ?

Classification Comments: None

ALLIANCE DISTRIBUTION

Range: This alliance is found in Minnesota, Iowa, Missouri, Kansas, Illinois, Wisconsin, Indiana, Michigan, Ohio, Alabama, Arkansas, Georgia, Kentucky, Louisiana, Mississippi, Oklahoma, Tennessee, Texas, New York, and Virginia, and in Canada in southern Ontario.

Subnations: AL, AR, CT, GA, IA, IL, IN, KS, KY, LA, MA, MI, MN, MO, MS, NY, OH, OK, ON, TN, TX, VA, WI, WV

TNC Ecoregions: 32:C, 35:C, 36:C, 37:C, 38:C, 39:C, 40:C, 41:C, 42:C, 43:C, 44:C, 45:C, 46:C, 47:C, 48:C, 49:C, 50:C, 51:C, 52:C, 53:?, 56:P, 59:C, 61:C, 62:C

USFS Ecoregions: 212Hu:CCC, 212Hy:CCP, 212Jd:CCC, 212Jg:CCC, 212Kb:CCC, 212Mb:C??, 212Nc:CCC, 221Ea:CCC, 221Ed:CCP, 221Eg:CCC, 221Fa:CCC, 221Hb:CCC, 221Hc:CCC, 221He:CCC, 221Ja:CCC, 222Ab:CCC, 222Ac:CCC, 222Ae:CC?, 222Ag:CCC, 222Ai:CCC, 222Ak:CC?, 222Am:CCC, 222Ao:CCC, 222Aq:CCC, 222Ca:CC?, 222Cb:CCC, 222Cc:CCP, 222Cd:CCP, 222Ce:CCP, 222Cf:CCP, 222Cg:CCP, 222Da:CP?, 222Dc:CP?, 222Dd:CP?, 222Dg:CP?, 222Dh:CPP, 222Dj:CP?, 222Ea:CC?, 222Eb:CCC, 222Ec:CCP, 222Ed:CCP, 222Ee:CC?, 222Ef:CCP, 222Eg:CCC, 222Eh:CCC, 222Ei:CC?, 222Ej:CCC, 222Ek:CCC, 222En:CCC, 222Eo:CCC, 222Fa:C??, 222Fb:C??, 222Fc:C??, 222Fd:C??, 222Ga:CCC, 222Gb:CCC, 222Ge:CCC, 222Ha:CCC, 222Hb:CCC, 222Hc:CCC, 222Hf:CCC, 222Ib:CCP, 222If:CCC, 222Ja:CCP, 222Jh:CCC, 222Ji:CCC, 222Jj:CCC, 222Ka:CCC, 222Ke:CCC, 222Kf:CCC, 222Kg:CCC, 222Kh:CCC, 222Ki:CCC, 222Kj:CCC, 222La:CCC, 222Lb:CCC, 222Lc:CCC, 222Le:CCC, 222Lf:CCC, 222Ma:CCC, 222Mb:CCC, 222Mc:CCC, 222Md:CCC, 222Me:CCC, 231Ba:CCC, 231Bg:CC?, 231Bh:CC?, 231Bj:CCC, 231Bk:CCP, 231Cd:CP?, 231Ce:CPP, 231Da:CC?, 231Dc:CCC, 231De:CCC, 231Ea:CCC, 231Eb:CCC, 231Eh:CCC, 231Ej:CCC, 231Ga:CCC, 231Gb:CCC, 231Gc:CCC, 232Aa:CCC, 232B:C?, 232Fa:CCC, 232Fb:CC?, 232Fe:CCC, 234Ac:CCC, 234Ae:CCC, 234Aj:CC?, 251Aa:CCC, 251Ba:CCC, 251Bb:CCC, 251Bd:CCC, 251Be:CCC, 251Ca:CCC, 251Cc:CCC, 251Cd:CC?, 251Cf:CCC, 251Ch:CCC, 251Ci:CCC, 251Cj:CCC, 251Ck:CCC, 251Da:CCC, 251Db:CCC, 251Dc:CCC, 251Dd:CCC, 251De:CCC, 251Df:CCC, 251Dg:CCC, 251Dh:CCC, 251Ea:CCC, 251Eb:CCC, 251Fb:C??, 251Fc:C??, 255Ai:CCC, 255Aj:CCC, 255Ba:CCC, 255Cd:CCP, 255Cf:CCP, 255D:CC, 263A:CC, M221Db:CCC, M231Aa:???, M231Ab:???, M231Ac:???, M231Ad:???, M242A:CC, M261A:CC

Federal Lands: COE (Lake Millwood); DOD (Arnold, Fort Campbell, Fort Chaffee, Fort Hood, Warner Robins); DOE (Oak Ridge); NPS (Blue Ridge Parkway?, Mammoth Cave, Stones River); TVA (Land Between the Lakes); USFS (Bienville, Caddo/LBJ, Daniel Boone, Kisatchie, Sam Houston, Tombigbee)

ALLIANCE SOURCES

References: Allard 1990, Chapman 1984, Curtis 1959, DeSelm 1990, Diamond 1993, Diamond and Smeins 1984, Diamond and Smeins 1985, Diamond and Smeins 1988, Diamond and Smeins 1990, Evans 1991, Evers 1955, Faber-Langendoen et al. 1996, Foti 1994b, Foti et al. 1994, Hart and Lester 1993, Heikens et al. 1994, Homoya 1994, Hutchison 1994, MNNHP 1993, Martin and Smith 1991, Nelson 1985, Pyne 1994, Reschke 1990, Rostlund 1957, Smith 1996a, Smith et al. 1989, Swain and Kearsley 2001, Turner et al. 1999, Voigt and Mohlenbrock 1964, White and Madany 1978, Wieland 1995

VII. Sparse Vegetation

VII.C.4.N.c. Seasonally / temporarily flooded mud flats

VII.C.4.N.C. NON-TIDAL MUD FLAT SEASONALLY/TEMPORARILY FLOODED SPARSELY VEGETATED ALLIANCE (A.1878)
NON-TIDAL MUD FLAT SEASONALLY/TEMPORARILY FLOODED SPARSELY VEGETATED ALLIANCE

ALLIANCE CONCEPT

Summary: This is technically not an alliance. It is a placeholder for a group of sparsely vegetated associations that do not have adequate vegetation descriptions, but do share certain substrate characteristics.
Related Concepts: No information
Classification Comments: None

ALLIANCE DISTRIBUTION

Range: This alliance is found in Alabama, Arkansas, Kentucky, Tennessee, Michigan, Wisconsin (?), Minnesota, Indiana, Iowa (?), and Illinois (?). It is also found in Ontario and Manitoba, Canada.
Subnations: AL, AR, IA?, IL, IN, KY, MA, MB, ME, MI, MN, NH, NY, ON, TN, VT, WI
TNC Ecoregions: 35:C, 36:C, 38:C, 39:C, 43:P, 44:C, 46:C, 47:C, 48:C, 61:C, 63:C, 64:C
USFS Ecoregions: 212Bb:CCC, 212Ca:CCP, 212Cb:CCC, 212Da:CCC, 212Dc:CCC, 212Ea:CCP, 212Ec:CCC, 212Ed:CCP, 212Ee:CCP, 212Hj:CPP, 212Hl:CPP, 212Ja:CP?, 212Jn:CPP, 212La:CPP, 212Lb:CPP, 212Lc:CPP, 212Ld:CPP, 212Ma:CPP, 212Mb:CP?, 212Na:CC?, 212Nb:CCP, 212Nc:CCC, 212Nd:CCP, 221Af:CCC, 221Ai:CCC, 221Ak:CCC, 221Al:CCC, 222Ha:PPP, 222Ji:PPP, 251Aa:PP?, 251Ba:P??, M212Ab:CCC, M212Ac:CCC, M212Ae:CCC, M212Af:CCC, M212Ag:CCC
Federal Lands: NPS (Acadia, Fort Donelson); USFS (Land Between the Lakes?)

ALLIANCE SOURCES

References: No information

ASSOCIATIONS GROUPED BY ECOLOGICAL SYSTEM

UPLANDS, VEGETATED

CULTIVATED FOREST

BALD-CYPRESS PLANTED FOREST

ELEMENT IDENTIFIERS

NVC association: *Taxodium distichum* Planted Forest
Database Code: CEGL007452
Formation: Planted/cultivated cold-deciduous forest (I.B.2.C.x)
Alliance: *Taxodium distichum* Planted Forest Alliance (A.212)

ELEMENT CONCEPT

Summary: Plantations of *Taxodium distichum*, grown for timber.
Environment: No information
Vegetation: No information
Dynamics: No information
Similar Associations:
Related Concepts: No information
Classification Comments: Stands are planted at Land Between the Lakes, Tennessee, Kentucky?

CONSERVATION RANKING & RARE SPECIES

GRank: GNA (cultural) (2002-10-24): This forest represents silviculturally planted and managed vegetation and is not of conservation concern, and therefore does not receive a conservation status rank.
High-ranked species: No information

ELEMENT DISTRIBUTION

Range: This planted vegetation type could occur in various coastal and interior provinces of the eastern and southeastern United States.
Subnations: NC, TN
TNC Ecoregions: 44:C, 52:C, 57:C
USFS Ecoregions: 222:C, 231A:CC, 232:C
Federal Lands: USFS (Land Between the Lakes)

ELEMENT SOURCES

References: Southeastern Ecology Working Group n.d.

LOBLOLLY PINE PLANTED FOREST

ELEMENT IDENTIFIERS

NVC association: *Pinus taeda* Planted Forest
Database Code: CEGL007179
Formation: Planted/cultivated temperate or subpolar needle-leaved evergreen forest (I.A.8.C.x)
Alliance: *Pinus taeda* Planted Forest Alliance (A.99)

ELEMENT CONCEPT

Summary: This association represents young, monospecific planted stands of *Pinus taeda*. Due to the commercial value of this species, this type is widely distributed across much of the southeastern United States from the Interior Highlands to the Coastal Plain, including areas outside the natural range of the species. The core concept of stands attributable to this type are those which support dense, often perfect rows of planted *Pinus taeda* or otherwise dense, young stands which are established, managed, and/or maintained for the extraction of forest products (usually pulpwood). In most cases these stands support almost no other tree species in the overstory. Understory composition and density can vary widely depending upon location, management history, and stand age. Stands are typically established with mechanical planting, but may also be established through other means. This association rarely exceeds 20-40 years of age on most timberlands. Excluded from this association are plantation stands which have "broken up" with age or thinning to approximate a more natural structure. Dense planting in rows, if successful, tends to result in nearly complete canopy closure which persists until the stand has either been regenerated or transitions into a different association. Herbaceous ground cover of any kind tends to be sparse due to reduction during site preparation, the typically dense canopy cover, and to the fact that many young plantations are infrequently burned at best.

Environment: No information
Vegetation: In the Ouachita Mountains planted loblolly is found with a variable amount of *Quercus alba, Quercus falcata, Quercus marilandica, Quercus stellata,* and *Quercus velutina*; on drier sites *Pinus echinata, Carya alba,* and *Carya texana*; and *Acer rubrum, Liquidambar styraciflua,* and *Quercus nigra* on wetter sites. The understory can be thick especially after thinning and/or burning. Common understory species are *Vaccinium pallidum, Vaccinium arboreum, Vaccinium stamineum, Cornus florida, Ulmus alata*, and others. Vines are an important component, including *Berchemia scandens, Vitis* spp., *Smilax* spp., and *Toxicodendron radicans*. In dense stands the herbaceous layer is suppressed by dense needle litter. In thinned and burned stands the plantations are often grazed. Herbaceous species can include *Solidago ulmifolia, Chasmanthium sessiliflorum, Schizachyrium scoparium, Danthonia spicata, Tephrosia virginiana, Lespedeza* spp., *Symphyotrichum patens (= Aster patens), Eupatorium* spp., and others. In Oklahoma, associates include *Rhus copallinum, Hypericum densiflorum, Liquidambar styraciflua* and *Toxicodendron radicans* (Hoagland 2000). Additional data on several stands on the Croatan National Forest can be found in Doyle and Allard (1990).
Dynamics: No information
Similar Associations:
- *Pinus taeda / Liquidambar styraciflua - Acer rubrum* var. *rubrum / Vaccinium stamineum* Forest (CEGL006011) -- develops when stands develop typical two-layered structure with well-developed subcanopy.
- *Pinus taeda / Rhus copallinum* Managed Forest (CEGL007108) -- may replace this association as stands mature.
- *Pinus taeda / Saccharum alopecuroidum - (Andropogon* spp.) Forest (CEGL007109)

Related Concepts:
- Loblolly Pine: 81 (Eyre 1980) B

Classification Comments: At Arnold Air Force Base, Coffee and Franklin counties, Tennessee, *Pinus taeda* is near the edge of its putative natural range, and was apparently absent prior to being planted there between 1945 and 1950 on abandoned agricultural land and along roadsides. Older plantings have not been intensively managed, and many have become `modified' vegetation (e.g., CEGL007109), and are no longer regarded as plantations. More recently (1998-2001) some of these older pine stands have been harvested and replaced with true *Pinus taeda* plantations. *Pinus taeda* also invades seasonally wet hardwood depressions, but these stands remain recognizable as to their natural identity (e.g., CEGL007364).

Associations occur as plantations and on old fields on Kisatchie and Sumter national forests and after blowdowns on the Kisatchie. South Carolina information after Jones et al. (1981).

In the Coastal Plain of South Carolina, there are mature loblolly plantations, often with *Prunus serotina* in the understory, that have been prescribed burned (based on seven plots at Savannah River Site) - such stands are presumably better covered under *Pinus taeda* Forest Alliance (A.130).

CONSERVATION RANKING & RARE SPECIES

GRank: GNA (cultural) (2000-8-8): This community represents vegetation which has been planted in its current location by humans and/or is treated with annual tillage, a modified conservation tillage, or other intensive management or manipulation. It is not a conservation priority and does not receive a conservation rank.
High-ranked species: No information

ELEMENT DISTRIBUTION

Range: This association is found throughout the southeastern United States.
Subnations: AL, AR, FL, GA, KY, LA, MD, MS, NC, OK, SC, TN, TX, VA?
TNC Ecoregions: 38:C, 39:C, 40:C, 41:C, 42:P, 43:C, 44:C, 50:C, 51:C, 52:C, 53:C, 56:P, 57:C, 58:P
USFS Ecoregions: 221Jb:CCC, 222C:CC, 222E:CC, 231Aa:CCC, 231B:CC, 231Ca:CPP, 231Cd:CPP, 231E:CC, 232Bm:CCC, 232Br:CCC, 232Ca:CCC, 232Cb:CCC, 232Ce:CCC, 234A:CC, M221D:CC, M222A:CC, M231A:CC
Federal Lands: DOD (Arnold, Fort Benning, Fort Bragg, Fort Gordon, Fort Stewart); DOE (Savannah River Site); USFS (Angelina, Bankhead?, Bienville, Cherokee, Conecuh, Croatan, Davy Crockett, De Soto, Delta, Francis Marion, Kisatchie, Land Between the Lakes, Oconee, Ouachita, Ozark, Sabine NF, Sam Houston, St. Francis?, Sumter, Talladega, Tuskegee); USFWS (Eufaula)

ELEMENT SOURCES

References: ALNHP 2002, Doyle and Allard 1990, Eyre 1980, Hoagland 1998a, Hoagland 2000, Jones et al. 1981b, Southeastern Ecology Working Group n.d., TNC 1998a

VIRGINIA PINE PLANTED FOREST

ELEMENT IDENTIFIERS

NVC association: *Pinus virginiana* Planted Forest
Database Code: CEGL004730
Formation: Planted/cultivated temperate or subpolar needle-leaved evergreen forest (I.A.8.C.x)
Alliance: *Pinus virginiana* Planted Forest Alliance (A.100)

ELEMENT CONCEPT

Summary: This association includes planted stands of *Pinus virginiana* which have little understory, but they may have admixtures of other native or off-site pines (e.g., *Pinus echinata, Pinus strobus, Pinus taeda*). These are cultivated forests and are not considered natural or near-natural vegetation. They are maintained as plantations for the harvest of forest products, or for production of Christmas trees and on strip-mined sites. Stands have suffered some damage from the Southern Pine Beetle (*Dendroctonus frontalis*). Stands are planted in the Inner Coastal Plain for Christmas tree production.

Environment: These are cultivated forests and are not considered natural or near-natural vegetation. They are maintained as plantations for the harvest of forest products. Stands are planted in the Inner Coastal Plain for Christmas tree production.

Vegetation: his association includes planted stands of *Pinus virginiana* with little understory, but may have admixtures of other native or off-site pines (e.g., *Pinus echinata, Pinus strobus, Pinus taeda*). At Arnold Air Force Base, Coffee and Franklin counties, Tennessee, *Pinus virginiana* is dominant in dry-mesic, low to mid-slope forests. *Pinus strobus* is scattered throughout, with *Juniperus virginiana var. virginiana* occurring in patches. The subcanopy contains *Acer rubrum, Cornus florida*, and *Liquidambar styraciflua*. The tall-shrub layer includes *Sassafras albidum, Cornus florida, Cercis canadensis, Liquidambar styraciflua*, and *Quercus stellata*. The herbaceous layer is sparse or nearly absent, and contains *Polystichum acrostichoides*, Asteraceae sp., *Carex* spp., *Botrychium biternatum*, and exotic *Lonicera japonica*.

Dynamics: Stands have suffered some damage from the Southern Pine Beetle (*Dendroctonus frontalis*).

Similar Associations:

Related Concepts:

- IF3b. Plantation (Hardwood or Conifer) (Allard 1990) B
- Virginia Pine: 79 (Eyre 1980) B

Classification Comments: Stands have suffered some damage from the Southern Pine Beetle (*Dendroctonus frontalis*).

CONSERVATION RANKING & RARE SPECIES

GRank: GNA (cultural) (2000-8-8): This community represents vegetation which has been planted in its current location by humans and/or is treated with annual tillage, a modified conservation tillage, or other intensive management or manipulation. It is not a conservation priority and does not receive a conservation rank.

High-ranked species: No information

ELEMENT DISTRIBUTION

Range: This alliance is found throughout the Piedmont of the southeastern United States and ranges into part of the Cumberland Plateau, Interior Low Plateau, Inner Coastal Plain, and the Southern Blue Ridge. It is known to occur in Alabama, Georgia, Kentucky, North Carolina, South Carolina, Tennessee, Virginia, and may possibly range into Mississippi.

Subnations: AL, GA, KY, MS?, NC, SC, TN, VA

TNC Ecoregions: 43:C, 44:P, 50:C, 51:C, 52:C

USFS Ecoregions: 221Hc:CCC, 221He:CCC, 222Eb:CCC, 231B:CC, 232:?, M221Dc:???, M221Dd:???

Federal Lands: DOD (Arnold, Fort Gordon, Fort Stewart?); USFS (Chattahoochee, Cherokee, Daniel Boone, Land Between the Lakes?, Nantahala?, Pisgah?, Uwharrie?)

ELEMENT SOURCES

References: Allard 1990, Eyre 1980, Southeastern Ecology Working Group n.d.

SEMI-NATURAL FOREST

LOBLOLLY PINE / SWEETGUM - RED MAPLE / DEERBERRY FOREST

ELEMENT IDENTIFIERS

NVC association: *Pinus taeda / Liquidambar styraciflua - Acer rubrum* var. *rubrum / Vaccinium stamineum* Forest

Database Code: CEGL006011

Formation: Rounded-crowned temperate or subpolar needle-leaved evergreen forest (I.A.8.N.b)

Alliance: *Pinus taeda* Forest Alliance (A.130)

ELEMENT CONCEPT

Summary: This association represents stands in which *Pinus taeda* is the monospecific dominant tree in the overstory. These are generally early- to mid-successional forests where the pines have reached tree size (as opposed to saplings) and have been established for a long enough period to have developed a closed canopy. Below the canopy of *Pinus taeda*, a well-developed subcanopy of hardwoods is present. *Acer rubrum var. rubrum* and *Liquidambar styraciflua* are often the dominant species in the subcanopy. If significant numbers of these species enter the canopy, the stand would be covered by another association (e.g., CEGL008462). Although this forest may result from a planted stand [see CEGL007179], it is distinguished from young pine plantations by tree height and the formation of distinct stratal layers, especially a well-developed subcanopy. This type may also develop following site preparation, with or without site conversion, and also following agriculture. It is a wide ranging type, most common from the

Piedmont of Virginia, through North Carolina, South Carolina, Georgia and Alabama, likely extending throughout the adjacent Coastal Plain. A large amount of variability exists in species composition and density due to geographic and disturbance factors. Stands typically have more-or-less closed canopies, understories dominated by fire-intolerant hardwoods, and shrub-dominated lower strata.

Environment: This forest follows agricultural cropping or silvicultural site preparation on a variety of sites, and presumably is more likely on moderately dissected topography where fire is a rare occurrence. This community usually is not present on steep slopes and does not occur on wet soils. It occurs on well- to moderately well-drained soils, usually Ultisols, on sites that formerly were under hardwood cover or subjected to agriculture.

Vegetation: The tree canopy of *Pinus taeda* is at least 60% but may be considerably more dense, up to and including closed canopies. Tree subcanopy density varies with stand disturbance history but generally is <50%. Shrub and herb layer coverages do not exceed 25% and decrease with increasing age of the stand. Other species of pine, especially *Pinus echinata* and *Pinus virginiana* may be sparingly present in the canopy. Other species that may be present in the subcanopy include *Quercus coccinea, Quercus velutina, Quercus alba, Nyssa sylvatica, Carya glabra, Carya alba, Diospyros virginiana, Prunus serotina, Cornus florida, Liriodendron tulipifera*, and *Sassafras albidum* (NatureServe Ecology unpubl. data). Other species that may be present in the shrub stratum include *Juniperus virginiana, Vaccinium arboreum, Rhus copallinum, Gaylussacia baccata, Callicarpa americana*, and probably others. The herbaceous layer usually forms <5% cover and contains such species as *Gelsemium sempervirens, Chimaphila maculata, Polystichum acrostichoides*, and *Potentilla canadensis*. An example from Oconee National Forest has a thinned canopy and grassy herbaceous layer.

Dynamics: As *Pinus taeda* plantations mature, they are likely to develop into this community depending on management. The pine component initially outgrows the hardwoods and typically reaches the canopy first. Hardwoods rapidly fill in and reach the subcanopy if not aggressively suppressed though management. Although stands of this forest are most commonly related to forest management, they may also develop following agriculture on old, abandoned fields adjacent to a significant seed source of *Pinus taeda*..

Similar Associations:

- *Pinus echinata* Early-Successional Forest (CEGL006327) -- occurs in the same region but is dominated by *Pinus echinata* instead of *Pinus taeda*.
- *Pinus taeda - Liquidambar styraciflua* Semi-natural Forest (CEGL008462) -- a related, late-successional type.
- *Pinus taeda - Liriodendron tulipifera / Acer saccharum* Successional Forest (CEGL007105) -- of the Ridge and Valley. test
- *Pinus taeda* Plantation Forest (CEGL007179) -- applies to young, dense, monospecific, stands with plantation structure.

Related Concepts:

- IF3b. Plantation (Hardwood or Conifer) (Allard 1990) B
- Loblolly Pine (21) (USFS 1988) ?
- Loblolly Pine - Hardwood: 82 (Eyre 1980) B
- Loblolly Pine: 81 (Eyre 1980) B

Classification Comments:

CONSERVATION RANKING & RARE SPECIES

GRank: GNA (modified/managed) (2002-8-8): This is a successional forest composed of species native to the southeastern United States; it is not of conservation concern and does not receive a conservation status rank.

High-ranked species: No information

ELEMENT DISTRIBUTION

Range: This forest ranges from the Piedmont of Virginia, through North Carolina, South Carolina, Georgia and Alabama, extending into the adjacent eastern end of the Upper East Gulf Coastal Plain (e.g., Talladega National Forest).

Subnations: AL, GA, LA, MD, MS, NC, SC, TN, TX, VA

TNC Ecoregions: 40:C, 41:C, 43:C, 44:P, 52:C, 53:P, 56:P, 57:P, 58:?

USFS Ecoregions: 221D:CC, 231Aa:CCC, 231B:CC, 232:C, M221D:??

Federal Lands: NPS (Cowpens, Little River Canyon?); USFS (Land Between the Lakes?, Oconee, Sumter, Talladega, Uwharrie?)

ELEMENT SOURCES

References: Allard 1990, Eyre 1980, Felix et al. 1983, NatureServe Ecology - Southeastern U.S. unpubl. data, NatureServe Ecology - Southeastern U.S. unpubl. data, Southeastern Ecology Working Group n.d., USFS 1988

LITTLE BLUESTEM - (ASHY SUNFLOWER, FEWLEAF SUNFLOWER, THREELEAF ROSINWEED) HERBACEOUS VEGETATION

ELEMENT IDENTIFIERS

NVC association: *Schizachyrium scoparium - (Helianthus mollis, Helianthus occidentalis, Silphium trifoliatum)* Herbaceous Vegetation
Database Code: CEGL007805
Formation: Tall sod temperate grassland (V.A.5.N.a)
Alliance: *Schizachyrium scoparium - Sorghastrum nutans* Herbaceous Alliance (A.1198)

ELEMENT CONCEPT

Summary: This open, prairie-like community of the northern Highland Rim of Tennessee and adjacent Kentucky is dominated by grasses and forbs with scattered shrubby vegetation and, occasionally, trees. *Schizachyrium scoparium* is a strong dominant, with some *Sorghastrum nutans* present. Other more mesic grasses (*Andropogon gerardii, Tripsacum dactyloides*) are restricted to ditches. Other herbaceous components may include *Andropogon gyrans, Andropogon ternarius, Lespedeza capitata, Lespedeza virginica, Symphyotrichum novae-angliae (= Aster novae-angliae), Sericocarpus linifolius (= Aster solidagineus), Coreopsis major, Coreopsis tripteris, Helianthus angustifolius, Helianthus hirsutus, Solidago juncea, Pycnanthemum tenuifolium, Pycnanthemum verticillatum var. pilosum (= Pycnanthemum pilosum),* and *Lobelia puberula*. *Rudbeckia subtomentosa, Prenanthes barbata*, and *Agalinis auriculata (= Tomanthera auriculata)* are rare plants found in some examples. Typical woody species include *Quercus falcata, Quercus imbricaria, Cornus florida, Cercis canadensis, Prunus angustifolia, Ilex decidua, Rhus copallinum, Rosa carolina,* and *Symphoricarpos orbiculatus*. This community occurs on the northwestern Highland Rim / Pennyroyal Karst Plain of Tennessee and Kentucky. The largest extant examples are presently found on Fort Campbell military base, where ecological burning and fires from live-fire munitions use result in open herbaceous-dominated landscapes. This vegetation was the predominant type here in the early 1800s, and probably originated from burning of forests by Native Americans. Smaller examples of related vegetation farther north in Kentucky (e.g. portions of Athey Barrens KSNPC Preserve) are included here as well.
Environment: No information
Vegetation: *Schizachyrium scoparium* is a strong dominant, with some *Sorghastrum nutans* present. Other more mesic grasses (*Andropogon gerardii, Tripsacum dactyloides*) are restricted to ditches. Other herbaceous components may include *Andropogon gyrans, Andropogon ternarius, Lespedeza capitata, Lespedeza virginica, Symphyotrichum novae-angliae (= Aster novae-angliae), Sericocarpus linifolius (= Aster solidagineus), Coreopsis major, Coreopsis tripteris, Helianthus angustifolius, Helianthus hirsutus, Solidago juncea, Pycnanthemum tenuifolium, Pycnanthemum verticillatum var. pilosum (= Pycnanthemum pilosum),* and *Lobelia puberula*. *Rudbeckia subtomentosa, Prenanthes barbata*, and *Agalinis auriculata (= Tomanthera auriculata)* are rare plants found in some examples. Typical woody species include *Quercus falcata, Quercus imbricaria, Cornus florida, Cercis canadensis, Prunus angustifolia, Ilex decidua, Rhus copallinum, Rosa carolina*, and *Symphoricarpos orbiculatus*.
Dynamics: The largest extant examples are presently found on Fort Campbell military base, where ecological burning and fires from live-fire munitions use result in open herbaceous-dominated landscapes. This vegetation was the predominant type here in the early 1800s, and probably originated from burning of forests by Native Americans.
Similar Associations:
Related Concepts: No information
Classification Comments:

CONSERVATION RANKING & RARE SPECIES

GRank: G2G3 (1998-12-14): This prairie-like association is restricted to the flat landforms of the 'Kentucky Barrens' of the northern Highland Rim of Tennessee and adjacent Kentucky. These soils potentially support forests (in the absence of fire), and succession has eliminated most, if not all, examples except for those on Fort Campbell. On this military base, ecological burning and fires from live-fire munitions use result in open herbaceous-dominated landscapes. Fire was presumably an important factor in maintaining this community; in the absence of fire, this vegetation would convert to forest. Marginal examples of related, more mesic, vegetation types remain along roadsides or field margins. Except on Federal military lands, increasingly extensive agricultural development or new housing construction may be eliminating even sites with potential for restoration of this vegetation, which was historically the predominant type in this region.
High-ranked species: *Agalinis auriculata* (G3), *Prenanthes barbata* (G3)

ELEMENT DISTRIBUTION

Range: This prairie-like association is restricted to the flat landforms of the `Kentucky Barrens' of the northern Highland Rim of Tennessee and adjacent Kentucky.
Subnations: KY, TN
TNC Ecoregions: 44:C
USFS Ecoregions: 222Eh:CCC

Federal Lands: DOD (Fort Campbell); USFS (Land Between the Lakes)

ELEMENT SOURCES

References: Baskin et al. 1999, Southeastern Ecology Working Group n.d.

SOUTH-CENTRAL INTERIOR MESOPHYTIC FOREST

AMERICAN BEECH - SUGAR MAPLE - TULIPTREE UNGLACIATED FOREST

ELEMENT IDENTIFIERS

NVC association: *Fagus grandifolia - Acer saccharum - Liriodendron tulipifera* Unglaciated Forest
Database Code: CEGL002411
Formation: Lowland or submontane cold-deciduous forest (I.B.2.N.a)
Alliance: *Fagus grandifolia - Acer saccharum - (Liriodendron tulipifera)* Forest Alliance (A.227)

ELEMENT CONCEPT

Summary: This beech - maple forest is found in unglaciated areas of the east-central United States. Stands occur on unglaciated terraces and mesic slopes of maturely dissected plateaus and submontane regions. The aspect is neutral on sandy alluvial terraces and is northern to eastern on slopes. Soils are moderately well-drained, moist, rich and deep (100+ cm). The vegetation is dominated by a closed-canopy forest with a well-developed tall-shrub layer. The forest canopy is dominated by *Fagus grandifolia* and *Acer saccharum*. Other canopy species include *Liriodendron tulipifera, Liquidambar styraciflua, Fraxinus americana, Quercus rubra, Carya glabra* and *Carya cordiformis*. Shrubs commonly found in this community are *Asimina triloba* and *Lindera benzoin*. Herbaceous species are diverse, forming a dense cover. They include *Adiantum pedatum, Arisaema triphyllum, Asarum canadense, Carex blanda, Dicentra canadensis, Dioscorea quaternata, Galium circaezans, Menispermum canadense, Phegopteris hexagonoptera, Polystichum acrostichoides*, and *Sanguinaria canadensis*. The large size of dominant canopy species (over 30 m tall), herbaceous diversity, and accumulated litter emphasize the high degree of mesophytism. Community occurrences have been extensively logged, and the canopy openings favor regeneration of *Acer saccharum*. In the Appalachians of eastern Kentucky, other typical trees include *Aesculus flava* (locally abundant), *Juglans cinerea, Juglans nigra, Magnolia acuminata, Quercus muehlenbergii*, and *Ulmus rubra*.

Environment: Stands occur on unglaciated terraces and mesic slopes of maturely dissected plateaus and submontane regions. The aspect is neutral on sandy alluvial terraces and is northern to eastern on slopes. Soils are moderately well-drained, moist, rich, and deep (100+ cm). In Crowley's Ridge of Missouri, stands occur on moderate slopes of hills and valleys and on knolls or ridges of large alluvial terraces.

Vegetation: The vegetation is dominated by a closed-canopy forest with a well-developed tall-shrub layer. The forest canopy is dominated by *Fagus grandifolia* and *Acer saccharum*. Other canopy species include *Liriodendron tulipifera, Liquidambar styraciflua, Fraxinus americana, Quercus rubra, Carya glabra*, and *Carya cordiformis*. Shrubs commonly found in this community are *Asimina triloba* and *Lindera benzoin*. Herbaceous species are diverse, forming a dense cover. They include *Adiantum pedatum, Arisaema triphyllum, Asarum canadense, Carex blanda, Dicentra canadensis, Dioscorea quaternata, Galium circaezans, Menispermum canadense, Phegopteris hexagonoptera, Polystichum acrostichoides*, and *Sanguinaria canadensis*. The large size of dominant canopy species (over 30 m tall), herbaceous diversity, and accumulated litter emphasize the high degree of mesophytism (TNC 1995a). In the Appalachians of eastern Kentucky, other typical trees include *Aesculus flava* (locally abundant), *Juglans cinerea, Juglans nigra, Magnolia acuminata, Quercus muehlenbergii*, and *Ulmus rubra*. Shrub cover may be low to moderate, and includes *Cornus alternifolia* and *Cornus florida* Ground cover is moderate with frequent (or locally abundant) *Asarum canadense, Eurybia divaricata (= Aster divaricatus), Diplazium pycnocarpon (= Athyrium pycnocarpon), Hepatica nobilis var. acuta (= Hepatica acutiloba), Osmorhiza claytonii, Poa sylvestris, Ranunculus recurvatus, Sedum ternatum*, and *Uvularia grandiflora*, among others (Campbell 2001).

Dynamics: This community is a late successional mature community. Canopy closure is 100%, favoring a subcanopy dominated by American beech. Canopy openings are created by wind throws, insect and disease damage, and tree senescence. Sugar maple regeneration is prominent where these openings occur. Forest openings are rapidly colonized by dense stands of herbaceous vegetation. Succession is rapid due to ideal nutrient availability and soil moisture. Seed dispersal is accomplished by wind and seed-eating birds and mammals.

Similar Associations:

- *Acer saccharum - Liriodendron tulipifera - Fraxinus americana / Staphylea trifolia* Forest (CEGL006201) -- may overlap with CEGL002411.
- *Fagus grandifolia - Acer saccharum* Glaciated Midwest Forest (CEGL005013) -- may be similar to this community.
- *Fagus grandifolia - Quercus alba / Cornus florida* Forest (CEGL007881) -- a beech - white oak type.
- *Liriodendron tulipifera - Tilia americana var. heterophylla - Aesculus flava - Acer saccharum / Magnolia tripetala* Forest (CEGL005222) -- has coniferous evergreen species, such as eastern hemlock (*Tsuga canadensis*), as well as species such as white

basswood (*Tilia americana var. heterophylla*) and sweet buckeye (*Aesculus flava*), which are not present in CEGL002411 (Braun 1950).

Related Concepts:

- *Fagus - Acer saccharum - Liriodendron / Rhus radicans* community (Voigt and Mohlenbrock 1964) =
- *Fagus grandifolia - Acer saccharum* type (Franklin et al. 1993) ?
- Beech - Maple Forest (Braun 1950) I
- Beech - Sugar Maple: 60 (Eyre 1980) B
- Beech-maple-tuliptree forest (matrix, large patch) (CAP pers. comm. 1998) ?
- Eastern Broadleaf Forests: 102: Beech-Maple Forest (*Fagus-Acer*) (Kuchler 1964) B
- Terrestrial: Forest: Hardwood (TNC 1985) B
- UNESCO FORMATION CODE: I.B.3a (UNESCO 1973) B
- Western Mesophytic Forest (Braun 1950) I

Classification Comments: Braun (1950, p. 141-150) describes these beech - maple forests in the Hill Section of her Western Mesophytic Forest Region. Dry-mesic forests, in which *Quercus alba*, *Quercus rubra*, and *Carya ovata* dominate, often have American beech and sugar maple regeneration due to an increased availability of moisture when mature oaks are removed. Where logging is heavy in these oak - hickory stands, second-growth regeneration is often dominated by sugar maple and, to a lesser extent, American beech. Classification under these circumstances can be difficult. Conversely, where sugar maple is selectively removed by logging, American beech can occur in pure stands. Forests from the southern part of Crowley's Ridge (Arkansas) are placed in *Fagus grandifolia - Quercus alba - Liriodendron tulipifera / Hydrangea arborescens / Schisandra glabra* Forest (CEGL004663), where *Acer saccharum* is not a big component and *Quercus alba* is more common. This type may apply to other parts of Crowley's Ridge, but more information is needed.

CONSERVATION RANKING & RARE SPECIES

GRank: G4? (1996-10-3): Many community occurrences have been extensively logged, and the canopy openings favor regeneration of *Acer saccharum*. In Crowley's Ridge Section of Missouri, this community is rare and confined to protected valleys (Vancil Hollow Natural Area), but it has been so extensively eliminated that its classification is problematic. It is probably eliminated in the Lowlands Section of the state. Possible occurrences in Arkansas need to be examined further.

High-ranked species: No information

ELEMENT DISTRIBUTION

Range: This beech - maple forest is found in unglaciated areas of the east-central United States, ranging from southern Pennsylvania and Maryland southwest to southeastern Missouri, Kentucky and Tennessee, and possibly Arkansas. This community occupies mesic slopes of maturely dissected plateaus and submontane regions of the east-central United States. These sites were not covered by Wisconsin era glaciers.

Subnations: AR?, IL, IN, KY, MD?, MO, OH, PA, TN, WV

TNC Ecoregions: 38:C, 42:C, 43:C, 44:C, 45:C, 49:C, 50:P, 59:C, 61:C

USFS Ecoregions: 221D:CC, 221Ea:CCC, 221Eb:CCC, 221Ec:CCC, 221Ed:CCC, 221Ef:CCC, 221Eg:CCC, 221Ha:CCP, 221Hb:CCC, 221He:CCP, 221I:CP, 221J:CP, 222Ak:CP?, 222Ao:CPP, 222Aq:CPP, 222Ca:CPP, 222Ch:CPP, 222Db:CCC, 222Dc:CCC, 222De:CCC, 222Df:CCC, 222Dh:CCP, 222Di:CCC, 222Ei:CCC, 222Ek:CCC, 222El:CCC, 222Em:CCC, 222En:CCP, 222Eo:CCP, 222Fa:CCP, 222Fb:CCC, 222Fc:CCC, 222Fd:CCC, 222Fe:CCC, 222Ff:CCC, 222Gc:CCC, 222Gd:CCP, 222Hc:CCC, 234Ab:CCC, 234Ac:CCC, 234An:CCP, M221Ab:CCP, M221Ac:CCC, M221Ad:CCP, M221Ba:CCC, M221Bb:CCC, M221Da:CPP

Federal Lands: USFS (Daniel Boone?, Land Between the Lakes)

ELEMENT SOURCES

References: Behler 1988, Braun 1950, Bull and Farrand 1977, CAP pers. comm. 1998, Campbell 2001, Clark and Hutchinson 1994, Craighead 1949, Duncan and Duncan 1988, Evans 1991, Eyre 1980, Faircloth 1971, Fike 1999, Fralish 1987, Fralish 1988b, Franklin et al. 1993, Illinois Nature Preserve Commission 1973, Jenkins and Pallardy 1993, Kuchler 1964, Little 1980, Midwestern Ecology Working Group n.d., Mohlenbrock 1986, Niering 1979, SAF 1967, Schafale and Weakley 1985, Schwartz and Schwartz 1959, TNC 1985, TNC 1995a, UNESCO 1973, Voigt and Mohlenbrock 1964, White and Madany 1978

AMERICAN BEECH - WHITE OAK / FLOWERING DOGWOOD FOREST

ELEMENT IDENTIFIERS

NVC association: *Fagus grandifolia - Quercus alba / Cornus florida* Forest

Database Code: CEGL007881

Formation: Lowland or submontane cold-deciduous forest (I.B.2.N.a)

Alliance: *Fagus grandifolia - Quercus rubra - Quercus alba* Forest Alliance (A.229)

ELEMENT CONCEPT

Summary: This beech-white oak forest is found in the Interior Low Plateau of Tennessee, the Cumberland region of Kentucky, and adjacent areas of the Upper East Gulf Coastal Plain. Stands occur on mesic mid to lower slopes in moderately dissected terrain. Stand

positions vary from north-facing slopes and low slopes to high terraces along streams. The vegetation is dominated by *Fagus grandifolia* with more or less *Quercus alba* depending on past logging history. Associated canopy and subcanopy species can include *Acer saccharum, Quercus muehlenbergii, Acer rubrum, Cornus florida, Ostrya virginiana*, and *Ilex opaca*. Shrubs which may be present include *Vaccinium stamineum, Viburnum acerifolium, Euonymus americana*, and, in some occurrences, *Kalmia latifolia*. The herb layer can be relatively lush with such species as *Polystichum acrostichoides, Galium circaezans, Desmodium nudiflorum, Erythronium americanum, Hepatica nobilis var. obtusa, Epifagus virginiana, Tiarella cordifolia var. collina, Heuchera americana, Stellaria pubera, Podophyllum peltatum, Botrychium virginianum*, and others.

Environment: Stands occur on mesic mid to lower slopes in moderately dissected terrain. Stand positions vary from north-facing slopes and low slopes to more rocky stands (Franklin et al. 1993). At Land Between the Lakes, this community is restricted to deep limestone-derived soils of the Baxter Series and silty soils of the Brandon Series, generally on lower slopes with northwest, north, to southeast aspects (Franklin 1990).

Vegetation: The vegetation is dominated by *Fagus grandifolia* with more or less *Quercus alba* depending on past logging history. Associated canopy and subcanopy species can include *Liriodendron tulipifera, Acer saccharum, Quercus pagoda, Quercus rubra, Quercus coccinea, Cornus florida, Nyssa sylvatica, Sassafras albidum*, and *Ostrya virginiana* (NatureServe Ecology unpubl. data, Franklin 1990). Other potential species include *Quercus muehlenbergii, Acer rubrum*, and *Ilex opaca*. Shrubs which may be present include *Vaccinium stamineum, Viburnum acerifolium, Euonymus americana*, and in some occurrences, *Kalmia latifolia*. The herb layer can be relatively lush with such species as *Polystichum acrostichoides, Galium circaezans, Desmodium nudiflorum, Erythronium americanum, Hepatica nobilis var. obtusa, Epifagus virginiana, Tiarella cordifolia var. collina, Heuchera americana, Stellaria pubera, Podophyllum peltatum, Botrychium virginianum*, and others. Campbell (2001) provides an extensive list of species for eastern Kentucky; see also NatureServe Ecology unpublished data from Fort Donelson.

Dynamics: Stands may be successionally unstable, with an increase in mesophytic dominants over time (Franklin et al. 1993). However, ground layer fires that eliminated the mesophytic regeneration could stabilize the stands.

Similar Associations:

- *Fagus grandifolia - Acer saccharum - Liriodendron tulipifera* Unglaciated Forest (CEGL002411)
- *Fagus grandifolia - Liriodendron tulipifera / Euonymus americana / Athyrium filix-femina ssp. asplenioides* Forest (CEGL007201)
- *Quercus alba - (Liriodendron tulipifera, Liquidambar styraciflua) / Acer leucoderme / Calycanthus floridus / Athyrium filix-femina* Forest (CEGL008428) -- of the southern Ridge and Valley.
- *Quercus alba - Fagus grandifolia / Hydrangea quercifolia - Viburnum acerifolium / Carex picta - Polystichum acrostichoides* Forest (CEGL007213)

Related Concepts:

- *Acer saccharum - Quercus alba - Fagus grandifolia* type (Franklin et al. 1993) ?

Classification Comments: This association is similar to *Quercus alba - Fagus grandifolia / Hydrangea quercifolia - Viburnum acerifolium / Carex picta - Polystichum acrostichoides* Forest (CEGL007213), found in northern Alabama, but is more broadly defined and geographically distinct from CEGL007213. The associations have been kept separate until more detailed floristic and range information can be obtained for this type (CEGL007881). *Fagus grandifolia - Liriodendron tulipifera / Euonymus americana / Athyrium filix-femina ssp. asplenioides* Forest (CEGL007201) is somewhat similar, but lacks dominance by *Quercus* species. Information on species from stands in eastern Kentucky is provided by Campbell 2001, who tentatively crosswalks his 5C3 to this type. Further review is needed before incorporating his description.

CONSERVATION RANKING & RARE SPECIES

GRank: G4 (1999-12-15): This is not an inherently rare forest type, and many examples are still believed to be extant. The lack of element occurrences of this type does not reflect its relative abundance. Patch size may be small, but this is a somewhat widespread association (and may be merged with others as classification is resolved); many examples are still extant. Some stands have been impacted by removal of more valuable timber species (e.g., *Quercus alba*) and loss of herbaceous species diversity from the disturbance effects of logging. The Grank has been changed from G3G4 to G4 to reflect its true abundance.

High-ranked species: No information

ELEMENT DISTRIBUTION

Range: This association was defined for the Interior Low Plateau of Tennessee. It ranges to the Cumberlands of Kentucky, and Upper East Gulf Coastal Plain in Tennessee, but more information is needed to determine its full range.

Subnations: AL?, IN?, KY, TN

TNC Ecoregions: 43:C, 44:C, 50:C

USFS Ecoregions: 221Ha:CCC, 221He:CCC, 222Eb:CCP, 222Eg:CCC, 222Eh:CCP, 222Ei:CCP, 222Ek:CCP, 222Em:CCP, 222En:CCP, 222Eo:CCP

Federal Lands: NPS (Shiloh); USFS (Daniel Boone, Land Between the Lakes)

ELEMENT SOURCES

References: Campbell 2001, Evans 1991, Franklin et al. 1993, Franklin pers. comm., Southeastern Ecology Working Group n.d.

VIRGINIA PINE - (PITCH PINE, SHORTLEAF PINE) - (ROCK CHESTNUT OAK) / HILLSIDE BLUEBERRY FOREST

ELEMENT IDENTIFIERS

NVC association: *Pinus virginiana - Pinus (rigida, echinata) - (Quercus prinus) / Vaccinium pallidum* Forest
Database Code: CEGL007119
Formation: Rounded-crowned temperate or subpolar needle-leaved evergreen forest (I.A.8.N.b)
Alliance: *Pinus virginiana* Forest Alliance (A.131)

ELEMENT CONCEPT

Summary: This community includes *Pinus virginiana*-dominated forests of low-elevation ridges and steep upper slopes, occurring primarily in the Appalachian provinces of the eastern United States, from central Pennsylvania, south and west to northern Georgia and northern Alabama. This community occurs on narrow ridges, steep slopes, and other exposed topographic positions, over shallow, infertile soils. This mainly evergreen forest is often of low stature, with a somewhat open to closed canopy, sparse to very dense shrub cover dominated by ericaceous species, and a sparse herb stratum. *Pinus virginiana* is the canopy dominant throughout the range of the type. In some parts of the range, other *Pinus* species may be canopy associates, as well as dry site *Quercus* species (e.g., *Quercus prinus, Quercus coccinea*). Deciduous species may form a subcanopy or sapling stratum, particularly in areas where fire has been excluded. Common shrub dominants include *Vaccinium pallidum*, *Vaccinium stamineum*, and *Kalmia latifolia*. Herbs vary with geography but are typical of infertile, xeric habitats. Some typical herbs in this forest are *Baptisia tinctoria, Chimaphila maculata, Dichanthelium commutatum, Epigaea repens, Euphorbia corollata, Galax urceolata, Hypoxis hirsuta, Iris verna, Pityopsis graminifolia var. latifolia, Pteridium aquilinum var. latiusculum*, and *Schizachyrium scoparium*.

Environment: Stands of this forest occur on narrow ridges and knobs, steep, upper slopes, bluff and cliff tops, and other exposed sites throughout the range of the type. They are found primarily on south-, southeast- or southwest-facing aspects on excessively drained, shallow soils. In the Blue Ridge Escarpment region, the western margin of the Blue Ridge, and west into the Ridge and Valley and Cumberland Mountains, this xeric forest occurs on convex slopes and ridges below 610 meters (2000 feet) elevation, over soils classed as Inceptisols, typically Lithic Dystrochrepts originating from sandstone, shale and other noncalcareous parent material. Its environmental situation in the western Alleghenies is not known. In the Interior Low Plateau of Kentucky, Tennessee, and Indiana, this association occurs in edaphically extreme situations, including bluff tops and narrow ridges in thin soils weathered from relatively acidic caprocks with southern and western aspects, as well as other similar slopes, over cherty limestone, siltstones, sandstones, and shales. In particular, in the Knobstone Escarpment Subsection (a few Indiana counties just north of Louisville, Kentucky) it occurs in glade-like situations on steep slopes with thin soils.

Vegetation: This community is a needle-leaved evergreen forest with a somewhat open to closed canopy. A deciduous subcanopy may be present, especially in areas where fire has been excluded. The shrub layers can be sparse to very dense and are composed of tall and short shrubs, predominantly ericaceous species. Herb cover is sparse, and leaf litter often dominates the ground layer. *Pinus virginiana* is the canopy dominant throughout the range of the type. In the southern Appalachians and southern Ridge and Valley it may occur with mixes of *Pinus rigida, Pinus echinata*, or *Pinus strobus*. Within its range, *Pinus pungens* may be present as a very minor component. Small stems of *Quercus prinus, Quercus coccinea, Acer rubrum, Nyssa sylvatica*, and *Oxydendrum arboreum* are common in the subcanopy and sapling strata, particularly in areas where fire has been excluded. In the southern Blue Ridge/Piedmont and southern Blue Ridge/Ridge and Valley transition regions, *Quercus marilandica, Quercus falcata*, and *Quercus stellata* can be deciduous components. Common shrub dominants include *Vaccinium pallidum, Vaccinium stamineum*, and *Kalmia latifolia*. Other typical shrubs can include *Gaylussacia ursina, Gaylussacia baccata, Sassafras albidum*, and *Vaccinium hirsutum* (southwestern North Carolina and southeastern Tennessee only). *Smilax glauca* and *Smilax rotundifolia* can be common vines. Characteristic herbaceous species from the southern Blue Ridge and southern Ridge and Valley include *Baptisia tinctoria, Chimaphila maculata, Dichanthelium commutatum, Epigaea repens, Euphorbia corollata, Galax urceolata, Hypoxis hirsuta, Iris verna, Pityopsis graminifolia var. latifolia, Pteridium aquilinum var. latiusculum*, and *Schizachyrium scoparium*. Typical herbs from examples in the western portion of the range (Interior Low Plateau) include *Antennaria plantaginifolia, Antennaria solitaria, Carex albicans var. albicans (= Carex artitecta), Danthonia spicata, Dichanthelium dichotomum, Lespedeza violacea (= Lespedeza intermedia), Hieracium gronovii, Hieracium venosum, Krigia biflora, Solidago erecta*, and *Tephrosia virginiana* (M. Homoya pers. comm. 1999). In some of these examples *Opuntia humifusa, Calamagrostis porteri ssp. insperata*, and *Solidago squarrosa* may occur locally.

Dynamics: This xeric, evergreen forest community will be maintained on sites where local soil conditions, topographic extremes, or occasional fire function to retard hardwood invasion. Infestations of southern pine beetle (*Dendroctonus frontalis*) can cause mortality of canopy trees. Examples affected by southern pine beetle in the Great Smoky Mountains can have up to 80-90% standing dead pine. Throughout most of its range, this community occurs as linear features along ridge tops and may be adjacent to or grade into xeric forests dominated by *Quercus coccinea* or *Quercus prinus* or more mesic forests dominated by *Quercus alba, Quercus rubra, Quercus velutina, Carya glabra*, and *Carya alba*. In the Interior Low Plateau, individual stands can be small in size, occurring in a matrix of *Quercus prinus* or *Quercus prinus - Quercus alba* forest (e.g., *Quercus prinus / Smilax* spp. Forest (CEGL005022) or *Quercus prinus - Quercus (alba, coccinea, velutina) / Viburnum acerifolium - (Kalmia latifolia)* Forest (CEGL005023)), but in more edaphically extreme circumstances.

Similar Associations:
- *Pinus pungens - Pinus rigida - (Quercus prinus) / Kalmia latifolia - Vaccinium pallidum* Woodland (CEGL007097)
- *Pinus virginiana - Quercus (coccinea, prinus)* Forest (CEGL005040)
- *Pinus virginiana - Quercus falcata - Carya pallida* Forest (CEGL006354)
- *Pinus virginiana / Quercus marilandica* Serpentine Forest (CEGL006266)
- *Pinus virginiana* Successional Forest (CEGL002591)
- *Quercus (prinus, coccinea) / Kalmia latifolia / (Galax urceolata, Gaultheria procumbens)* Forest (CEGL006271)

Related Concepts:
- IA7c. Xeric Virginia Pine Ridge Forest (Allard 1990) B
- Low Mountain Pine Forest (Montane Pine Subtype) (Schafale 1998b) ?
- Oligotrophic Forest (Rawinski 1992) B
- Virginia Pine - Mixed Oaks, HR (Pyne 1994) B
- Virginia Pine - Oak: 78 (Eyre 1980) B
- Virginia Pine, BR, R&V, CUPL (Pyne 1994) B
- Virginia Pine: 79 (Eyre 1980) B
- Virginia pine forest (CAP pers. comm. 1998) ?
- Xeric Pine Forest, Pine - Heath Ridge Forest (Ambrose 1990a) B

Classification Comments: Some vegetation formerly placed (at least conceptually) in the *Pinus virginiana - Quercus (coccinea, prinus)* Forest Alliance (A.408) and its provisional association *Pinus virginiana - Quercus (coccinea, prinus)* Forest (CEGL005040), has been transferred here, with this association (CEGL007119) becoming more geographically inclusive. In Indiana examples, the substrate is primarily a matrix of acidic siltstone, shale, and sandstone. Rarely are cliffs formed; instead the setting is mostly very steep slopes with high hills and deep ravines. This association also includes vegetation from the transition between the Cumberland Plateau / Southern Ridge and Valley and the Upper East Gulf Coastal Plain in Alabama. Though located in the Coastal Plain, these occurrences are physiographically and floristically similar to this montane association.

Early successional vegetation associated with old fields, old pastures, clearcuts, and burned or eroded areas and dominated by *Pinus virginiana* is classified as *Pinus virginiana* Successional Forest (CEGL002591). Appalachian xeric oak forests with similar floristics, but with a mainly deciduous canopy are classed in *Quercus (prinus, coccinea) / Kalmia latifolia / (Galax urceolata, Gaultheria procumbens)* Forest (CEGL006271). Appalachian shale forests and woodlands with *Pinus virginiana* occur on steep, shaley slopes and have a stunted canopies and sparse herb and shrub strata, characterized by species adapted to shaley substrates. These shale communities are classed in *Pinus virginiana - Quercus (coccinea, prinus)* Forest Alliance (A.408) and *Pinus (rigida, pungens, virginiana) - Quercus prinus* Woodland Alliance (A.677).

CONSERVATION RANKING & RARE SPECIES

GRank: G4? (2001-2-11): This xeric evergreen forest community will be maintained on sites where local soil conditions, topographic extremes, or occasional fire function to retard hardwood invasion. Infestations of southern pine beetle (*Dendroctonus frontalis*) can cause mortality of canopy trees. Examples affected by southern pine beetle in the Great Smoky Mountains can have up to 80-90% standing dead pine.

High-ranked species: *Buckleya distichophylla* (G2), *Penstemon deamii* (G1), *Thermopsis villosa* (G3?), *Vaccinium hirsutum* (G3)

ELEMENT DISTRIBUTION

Range: This community occurs primarily in the Appalachian region of the United States, ranging from central Pennsylvania, south and west through the Ridge and Valley, Blue Ridge, and Cumberland Plateau to northern Georgia and Alabama, extending westward to scattered areas in the Interior Low Plateau and eastward into the upper Piedmont. It is reported from the states of Georgia, North Carolina, South Carolina, Tennessee, Kentucky, Pennsylvania, Indiana, Ohio, and is probably in Maryland, Virginia, and West Virginia.

Subnations: AL, GA, IN, KY, MD?, NC, OH, PA, SC, TN, VA?, WV

TNC Ecoregions: 43:C, 44:C, 49:C, 50:C, 51:C, 52:C, 59:C, 61:P

USFS Ecoregions: 221Ea:CC?, 221Eb:CCC, 221Ec:CCC, 221Ed:CCP, 221Ef:CCC, 221Eg:CCC, 221Ha:CCC, 221Hb:CCC, 221Hc:CCP, 221He:CCC, 221Ja:CCC, 221Jb:CCC, 222Da:CCC, 222Dc:CCC, 222Dg:CCC, 222Dj:CCC, 222Eg:CCC, 222Ej:CCC, 222El:CCC, 222En:CCC, 222Eo:CCC, 222Fd:CCC, 222Ff:CCC, 231Aa:CCC, 231Ab:CCC, 231Ae:CCC, 231Bc:CCC, 231Cd:CCC, 231Da:CCC, 231Dc:CCC, M221Aa:CCP, M221Ab:CCC, M221Ac:CCC, M221Bd:CCP, M221Be:CCP, M221Cd:CCC, M221Dc:CCC, M221Dd:CCC

Federal Lands: NPS (Blue Ridge Parkway?, Chickamauga-Chattanooga, Great Smoky Mountains, Kennesaw Mountain, Kings Mountain, Little River Canyon?, Mammoth Cave); USFS (Bankhead, Chattahoochee, Cherokee, Daniel Boone, Land Between the Lakes?, Nantahala, Pisgah, Sumter, Talladega)

ELEMENT SOURCES

References: Allard 1990, Ambrose 1990a, Barden 1977, Burns and Honkala 1990a, CAP pers. comm. 1998, Cooper 1963, Core 1966, Evans 1991, Eyre 1980, Fike 1999, Gettman 1974, Homoya pers. comm., Malter 1977, NatureServe Ecology - Southeastern

U.S. unpubl. data, Nelson 1986, Patterson et al. 1999, Peet et al. unpubl. data 2002, Pyne 1994, Racine 1966, Rawinski 1992, Schafale 1998b, Schafale and Weakley 1990, Southeastern Ecology Working Group n.d., Walton et al. 1997, Whittaker 1956

SOUTHERN INTERIOR LOW PLATEAU DRY OAK FOREST

ROCK CHESTNUT OAK - OAK SPECIES / FARKLEBERRY (MOUNTAIN LAUREL, BIGLEAF SNOWBELL) FOREST

ELEMENT IDENTIFIERS

NVC association: *Quercus prinus - Quercus* spp. / *Vaccinium arboreum - (Kalmia latifolia, Styrax grandifolius)* Forest
Database Code: CEGL007700
Formation: Lowland or submontane cold-deciduous forest (I.B.2.N.a)
Alliance: *Quercus prinus - Quercus (alba, falcata, rubra, velutina)* Forest Alliance (A.249)

ELEMENT CONCEPT

Summary: These forests have canopies which are strongly dominated by *Quercus prinus*, with *Quercus coccinea* and/or *Quercus velutina*, and with lesser amounts of *Quercus rubra, Quercus alba, Nyssa sylvatica, Acer rubrum var. rubrum*, and *Carya alba*. The understory may contain *Oxydendrum arboreum, Fagus grandifolia, Sassafras albidum, Aralia spinosa*, and/or *Cornus florida*. The shrub stratum may be dense to sparse, partly dominated by ericaceous species. Typical shrub species can include *Viburnum acerifolium, Hypericum frondosum, Vaccinium stamineum, Vaccinium arboreum, Vaccinium pallidum, Vaccinium corymbosum*, and *Gaylussacia baccata*. Some examples will contain patches of *Kalmia latifolia*, or *Styrax grandifolius* may replace *Viburnum acerifolium* in some locales. *Smilax glauca* and *Smilax rotundifolia* are typically present. *Castanea dentata* may occur as root sprouts, and decaying stumps may still be evident. Scattered individuals of *Pinus echinata* or *Pinus virginiana* may be present in the subcanopy of some examples. The herb layer is typically sparse and includes subshrubs such as *Epigaea repens* and *Chimaphila maculata*. Other common species may include *Tipularia discolor, Antennaria plantaginifolia, Cypripedium acaule, Danthonia spicata, Epigaea repens, Helianthus divaricatus, Helianthus hirsutus, Dichanthelium dichotomum (= Panicum dichotomum)*, and *Polystichum acrostichoides*. Mats of mosses may cover the ground surface where herbaceous cover and leaf litter are sparse. This community occurs over shallow, rocky soils, on narrow ridgetops and upper, south- to southwest-facing slopes in the Interior Low Plateau and possibly adjacent provinces (Upper East Gulf Coastal Plain, Southern Cumberlands). This is the dominant forest type found on narrow ridges of the dissected western escarpment of the Eastern Highland Rim of Tennessee at about 350 m (1100 feet) elevation.
Environment: Stands occur on dry/xeric upper slopes and narrow ridgetops. Soils are typically shallow and occur over non-calcareous bedrock of sandstone, conglomerate, or shale, or, to the south, over thin loess and siliceous limestones and cherts.
Vegetation: These forests have canopies which are strongly dominated by *Quercus prinus*, with *Quercus coccinea* and/or *Quercus velutina*, and with lesser amounts of *Quercus rubra, Quercus alba, Nyssa sylvatica, Acer rubrum var. rubrum*, and *Carya alba*. The understory may contain *Oxydendrum arboreum, Fagus grandifolia, Sassafras albidum, Aralia spinosa*, and/or *Cornus florida*. The shrub stratum may be dense to sparse, partly dominated by ericaceous species. Typical shrub species include *Viburnum acerifolium, Hypericum frondosum, Vaccinium stamineum, Vaccinium pallidum, Vaccinium corymbosum*, and *Gaylussacia baccata*. Some examples will contain patches of *Kalmia latifolia*. Some Tennessee stands (e.g., in 222Eg, the Western Highland Rim) are outside of the range of *Viburnum acerifolium*, which is typically replaced by *Styrax grandifolius* in these situations. *Smilax glauca* and *Smilax rotundifolia* are typically present. *Castanea dentata* may occur as root sprouts, and decaying stumps may still be evident. Scattered individuals of *Pinus echinata* or *Pinus virginiana* may be present in the subcanopy of some examples. The herb layer is typically sparse and includes subshrubs such as *Epigaea repens* and *Chimaphila maculata*. Other common species may include *Tipularia discolor, Antennaria plantaginifolia, Cypripedium acaule, Danthonia spicata, Epigaea repens, Helianthus divaricatus, Helianthus hirsutus, Dichanthelium dichotomum (= Panicum dichotomum)*, and *Polystichum acrostichoides*. Mats of mosses may cover the ground surface where herbaceous cover and leaf litter are sparse.
Dynamics: No information
Similar Associations:
- *Quercus alba - Quercus rubra - Carya ovata* Glaciated Forest (CEGL002068)
- *Quercus alba - Quercus rubra - Quercus prinus - Acer saccharum / Lindera benzoin* Forest (CEGL002059) -- Appalachian oak-maple.
- *Quercus prinus - (Quercus coccinea) / Carya pallida / Vaccinium arboreum - Vaccinium pallidum* Forest (CEGL008431)
- *Quercus prinus - Carya ovata - Quercus rubra / Acer saccharum* Forest (CEGL007268) -- of the Ridge and Valley.
- *Quercus prinus - Quercus (alba, coccinea, velutina) / Viburnum acerifolium - (Kalmia latifolia)* Forest (CEGL005023) -- a related type of the Western Allegheny and related northern ecoregions.
- *Quercus prinus - Quercus (rubra, velutina) / Vaccinium angustifolium* Forest (CEGL006282) -- a more eastern equivalent?
- *Quercus prinus / Smilax* spp. Forest (CEGL005022) -- is perhaps a more xeric type.

Related Concepts:
- Chestnut Oak, HR (Pyne 1994) B
- IA6d. Chestnut Oak Slope and Ridge Forest (Allard 1990) ?

Classification Comments: This is at least part of the historic chestnut oak forest after loss of chestnut in the Interior Low Plateau and related ecoregions. More detailed floristic information is needed to reliably distinguish this association from other closely related forests in this alliance, such as *Quercus prinus - Carya ovata - Quercus rubra / Acer saccharum* Forest (CEGL007268) of the Ridge and Valley, *Quercus (prinus, coccinea) / Kalmia latifolia / (Galax urceolata, Gaultheria procumbens)* Forest (CEGL006271) of the Southern Blue Ridge, and the apparently more xeric *Quercus prinus / Smilax* spp. Forest (CEGL005022) of the lower Midwest and Kentucky.

CONSERVATION RANKING & RARE SPECIES

GRank: G4 (2002-10-24): This is a widespread type; *Quercus prinus* replaces itself after canopy removal, seeds germinate in the shade of parent trees, and stands can also replace themselves from stump sprouts. Stands are threatened primarily by conversion to other forest types (e.g., pine plantations) or to other land uses (e.g., pasture, housing development).
High-ranked species: No information

ELEMENT DISTRIBUTION

Range: This chestnut oak - mixed oak forest community ranges in the United States from the Cumberlands / Southern Ridge and Valley, and Interior Low Plateau of Kentucky, Tennessee, and Alabama (and possibly into the Upper East Gulf Coastal Plain of Mississippi).
Subnations: AL?, KY, MS?, TN
TNC Ecoregions: 43:P, 44:C, 50:C
USFS Ecoregions: 221Hc:CCC, 221Hd:CCP, 221He:CCP, 222Cc:CPP, 222Ce:CPP, 222Cf:CPP, 222Cg:CPP, 222Eb:CCC, 222Eg:CCC, 222Eo:CCC, 222Fd:CCC, 231Be:PPP
Federal Lands: USFS (Daniel Boone, Holly Springs?, Land Between the Lakes?)

ELEMENT SOURCES

References: Allard 1990, Evans 1991, Pyne 1994, Southeastern Ecology Working Group n.d.

ROCK CHESTNUT OAK / GREENBRIER SPECIES FOREST

ELEMENT IDENTIFIERS

NVC association: *Quercus prinus / Smilax* spp. Forest
Database Code: CEGL005022
Formation: Lowland or submontane cold-deciduous forest (I.B.2.N.a)
Alliance: *Quercus prinus - (Quercus coccinea, Quercus velutina)* Forest Alliance (A.248)

ELEMENT CONCEPT

Summary: This chestnut oak / greenbrier forest type is found in the Interior Low Plateau region of the United States. Stands occur on dry sandy, rocky, and gravelly, noncalcareous, thin to deep upland soils of steep mid and upper slopes of hills, bluffs and ridges. Aspect is generally southern and western. Bedrock is predominantly sandstone (sometimes chert), with boulders and rock fragments at or near the surface. The dominant tree species is *Quercus prinus*. A variety of other tree species may also be present such as *Quercus velutina, Carya ovalis, Quercus alba, Quercus coccinea,* and *Quercus stellata*. The understory of this type is poorly developed (less than 50% cover) and consists of scattered, open-grown trees and shrubs and vines, including *Vaccinium arboreum* and *Smilax rotundifolia*. Ground cover consists of mixed herbaceous species and is generally sparse (less than 20%). Typical herbaceous species include *Antennaria plantaginifolia* and *Danthonia spicata*. There may be an abundance of lichens (*Cladina subtenuis, Xanthoparmelia conspersa (= Parmelia conspersa)*) and mosses (*Leucobryum glaucum*) occurring on exposed rock and dead wood.
Environment: Stands occur on dry sandy, rocky, and gravelly, non-calcareous, thin to deep upland soils of steep mid and upper slopes of hills, bluffs and ridges. Aspect is generally southern and western. Bedrock is predominantly sandstone (sometimes chert), with boulders and rock fragments at or near the surface (TNC 1995a). This type occurs on Saffell soils in Stewart County, Tennessee, which are deep and well-drained silt loams formed in Coastal Plain gravelly materials. Because of the high content of gravel in these soils (up to 65% by volume), these sites have very low moisture-holding capacity and occur on the most xeric end of the moisture gradient at Land Between the Lakes (Fralish et al. 1999, Close et al. 2002). This type may occur on steep slopes (up to 60%) which are unstable due to movement of pebbles and rocks; the surface of some sites is heavily covered by white pebbles (Fralish et al. 1999).
Vegetation: Trees in this forest make their best growth on steep lower slopes of small spur ridges. Individual trees are medium in size (8-20 m), with open, spreading, and often irregularly shaped crowns. Canopy closure is around 80-90%. The dominant tree species is *Quercus prinus*, but a variety of other tree species may also be present (Fralish et al. 1999). These other species include *Quercus alba, Quercus velutina, Quercus coccinea,* and *Carya ovalis*. The understory is poorly developed (less than 50% cover), possibly due to the droughty, nutrient-poor status of the soils. It may consist of scattered, open-grown trees and shrubs and vines, including *Vaccinium arboreum, Smilax rotundifolia, Sassafras albidum, Cornus florida, Fagus grandifolia, Ostrya virginiana,* and *Cercis canadensis*. Ground cover consists of mixed herbaceous species and is generally sparse (less than 20%), with an abundance of lichens and mosses occurring on exposed rock and dead wood. Typical herbaceous species include *Antennaria plantaginifolia* and

Danthonia spicata (TNC 1995a). *Carex picta* can be important in examples of this type in the Brown County Hills Subsection of Indiana (Van Kley et al. 1995).

Dynamics: This community is heavily influenced by the droughty, nutrient-poor soils. In portions of its natural range, this community may have resulted from fire suppression in barrens and savannas (Fralish et al. 1999). Natural disturbance includes seasonal drought, wind damage, cyclic fire, and occasionally lightning strikes. Periodic fire encourages regeneration of oaks and hickories, and may contribute to poor development of the understory in this type. Where fire is suppressed, sugar maple and American beech can become invasive (TNC 1995a).

Similar Associations:

- *Quercus prinus - Quercus (alba, coccinea, velutina) / Viburnum acerifolium - (Kalmia latifolia)* Forest (CEGL005023) -- is an eastern Allegheny type which is perhaps less xeric.
- *Quercus prinus - Quercus* spp. */ Vaccinium arboreum - (Kalmia latifolia, Styrax grandifolius)* Forest (CEGL007700) -- which is a more dry-mesic and diverse forest found to the south of CEGL005023.

Related Concepts:

- *Quercus prinus - (Quercus coccinea) - Q. velutina/Smilax* spp. Forest (F86) (TNC 1995a) ?
- Black Oak: 110 (Eyre 1980) B
- Dry Sandstone Forest (White and Madany 1978) B
- Dry Upland Forest (White and Madany 1978) B Eastern Broadleaf Forests: 100: Oak-Hickory Forest (*Quercus-Carya*) (Kuchler 1964) B
- Gravel barrens community (Fralish et al. 1999) ?
- Terrestrial: Forest: Hardwood (TNC 1985) B
- UNESCO FORMATION CODE: I.B.3a (UNESCO 1973)

Classification Comments: In Illinois, *Smilax* spp. are not as common as in Indiana. Some stands may have more of a mixed oak component. Type is also found in the Shawnee Hill region of Kentucky. Distribution of this type in the Southeast needs to be assessed. A subtype occurs in the Ozark Hills of southern Illinois where *Quercus prinus* and *Quercus velutina* codominate stands. *Cornus florida, Amelanchier arborea, Sassafras albidum,* and *Ostrya virginiana* are typical shrub and small tree components. This subtype may in fact belong to the *Quercus velutina - Quercus prinus - Carya* spp. Ozark Forest found in Missouri and Arkansas (TNC 1995a).

CONSERVATION RANKING & RARE SPECIES

GRank: G3G5 (1998-6-22): No information

High-ranked species: No information

ELEMENT DISTRIBUTION

Range: This chestnut oak / greenbrier forest type is found in the Interior Low Plateau region of the United States, ranging from southern Illinois east to southern Ohio and south to Kentucky and possibly Tennessee. This community occurs on dry, rocky, and gravelly upper slopes and ridgetops where soil chemistry is affected by acidic bedrock. Occurrences can be large as chestnut oak and black oak are dominant species on dry uplands east of the Mississippi River.

Subnations: IL, IN, KY, OH?, TN

TNC Ecoregions: 38:C, 44:C, 50:?

USFS Ecoregions: 221D:PP, 221Ec:PPP, 221Ed:PPP, 221Ef:PPP, 221H:PP, 221I:PP, 222Aq:CCC, 222Da:CCP, 222Db:CCC, 222Dc:CCP, 222De:CCC, 222Dg:CCP, 222Dh:CCP, 222Dj:CCP, 222Ei:CCC, 222Ek:CCP, 222El:CCC, 222Em:CCC, 231A:PP, 231C:PP, 231D:PP, M221A:PP, M221C:P?

Federal Lands: DOD (Fort Knox); USFS (Land Between the Lakes)

ELEMENT SOURCES

References: Behler 1988, Bull and Farrand 1977, Clark and Hutchinson 1994, Close et al. 2002, Craighead 1949, Duncan and Duncan 1988, Evans 1991, Eyre 1980, Fralish et al. 1999, Illinois Nature Preserve Commission 1973, Kuchler 1964, Little 1980, Midwestern Ecology Working Group n.d., Mohlenbrock 1986, Nelson 1985, Niering 1979, SAF 1967, Schwartz and Schwartz 1959, TNC 1985, TNC 1995a, Thornbury 1965, UNESCO 1973, Van Kley et al. 1995, Voigt and Mohlenbrock 1964, White and Madany 1978

SOUTHERN RED OAK - WHITE OAK - POST OAK - BLACK OAK FOREST

ELEMENT IDENTIFIERS

NVC association: *Quercus falcata - Quercus alba - Quercus stellata - Quercus velutina* Forest

Database Code: CEGL005018

Formation: Lowland or submontane cold-deciduous forest (I.B.2.N.a)

Alliance: *Quercus alba - Quercus (falcata, stellata)* Forest Alliance (A.241)

ELEMENT CONCEPT

Summary: This dry-mesic southern red oak - mixed oak forest type is found in the central United States in the Interior Low Plateau. Stands occur on the upper slopes and ridgetops of moderately to maturely dissected hills, where they occupy narrow bands of dry-mesic habitat transitional between lower and midslope mesic communities and xeric ridgetops. Soils are most often a well-drained sandy loam, although clay loams are not uncommon. Bedrock is predominantly Paleozoic sandstone of Pennsylvanian age and is often exposed; the association may also occur on siltstone, shale, or coal, or over Mississippian limestones, especially in the southern part of its range. Karst topography can be found in areas where this community occurs. The vegetation is dominated by a closed-tree canopy. *Quercus alba, Quercus coccinea, Quercus falcata, Quercus stellata,* and *Quercus velutina* are among the oaks which dominate this dry-mesic forest. *Quercus falcata* reaches the northern extent of its range within this community. Other tree species include *Carya ovata, Carya glabra,* and *Carya alba*. The density and diversity of subcanopy, shrub, and herbaceous species are substantially less than are found in mesic forests due to limited moisture availability during most of the growing season. Typical shrubs and small trees include *Cornus florida* and *Sassafras albidum*. Common herbaceous species include *Sanicula canadensis, Desmodium nudiflorum, Desmodium nuttallii, Symphyotrichum urophyllum (= Aster sagittifolius), Symphyotrichum patens (= Aster patens), Solidago ulmifolia,* and *Podophyllum peltatum.*

Environment: Stands occur on the upper slopes and ridgetops of moderately to maturely dissected hills, where they occupy narrow bands of dry-mesic habitat transitional between lower and midslope mesic communities and xeric ridgetops. Soils are most often a well-drained sandy loam, although clay loams are not uncommon. Bedrock is predominantly Paleozoic sandstone of Pennsylvanian age and is often exposed; the association may also occur on siltstone, shale, or coal, or over Mississippian limestones, especially in the southern part of its range (Kentucky). Karst topography can be found in areas where this community occurs.

Vegetation: The vegetation is dominated by a closed-tree canopy. *Quercus alba, Quercus coccinea, Quercus falcata, Quercus stellata,* and *Quercus velutina* are among the oaks which dominate this dry-mesic forest. *Quercus falcata* reaches the northern extent of its range within this community. Other tree species include *Carya ovata, Carya glabra,* and *Carya alba*. The density and diversity of subcanopy, shrub, and herbaceous species are substantially less than are found in mesic forests due to limited moisture availability during most of the growing season. Typical shrubs and small trees include *Cornus florida* and *Sassafras albidum*. Common herbaceous species include *Sanicula canadensis, Desmodium nudiflorum, Desmodium nuttallii, Symphyotrichum urophyllum (= Aster sagittifolius), Symphyotrichum patens (= Aster patens), Solidago ulmifolia,* and *Podophyllum peltatum.*

Dynamics: Historically, fire may have periodically affected this community, increasing its range into more moist sites (Fralish et al. 1991, Robertson and Heikens 1994). Fires in the Shawnee and Ozark Hills just north of the range of this type were more frequent (almost annual) from the early 1900s to 1930, but there is little information on presettlement (prior to 1800) fire frequency (Robertson and Heikens 1994). Erosion also converts mesic forest soils to dry-mesic, creating conditions which may favor the occurrence of this community.

This community is a climax community where dry-mesic conditions dominate on mid to upper slopes of eastern oak - hickory associations. Logging and fire select for the occurrence of this community on more moist sites. Erosion can also affect soil water-holding capacity, converting mesic soils to dry-mesic, which creates conditions favoring the occurrence of this forest. Drier conditions and canopy openings increase the occurrence of black oak, while more moist conditions favor white oak.

Similar Associations:

- *Quercus alba - Quercus rubra - Carya (alba, ovata) / Cornus florida* Acid Forest (CEGL002067) -- lacks southern red oak as a dominant canopy species and occupies a broader range of habitats.
- *Quercus falcata - Quercus (coccinea, stellata) / Vaccinium (pallidum, stamineum)* Forest (CEGL007247)
- *Quercus falcata - Quercus alba - Carya alba / Oxydendrum arboreum / Vaccinium stamineum* Forest (CEGL007244)
- *Quercus velutina - Quercus alba - Carya (glabra, ovata)* Forest (CEGL002076) -- lacks southern red oak as a dominant canopy species and occupies a broader range of habitats.

Related Concepts:

- Dry-mesic Upland Forest (White and Madany 1978) B
- Eastern Broadleaf Forests: 100: Oak-Hickory Forest (*Quercus-Carya*) (Kuchler 1964) B
- Terrestrial: Forest: Hardwood (TNC 1985) B
- UNESCO FORMATION CODE: I.B.3a (UNESCO 1973) B
- Western Mesophytic Forest (Braun 1950) B

Classification Comments: More information is needed to distinguish this association from those recognized in the Southeast, such as *Quercus falcata - Quercus alba - Carya alba / Oxydendrum arboreum / Vaccinium stamineum* Forest (CEGL007244) and *Quercus falcata - Quercus (coccinea, stellata) / Vaccinium (pallidum, stamineum)* Forest (CEGL007247). The type does not appear to occur in the Ozark region, and in Arkansas, *Quercus falcata* is more common in the coastal plain. Selective removal of oaks for sawtimber can cause shifts in tree species dominance, thereby creating classification difficulties. *Quercus falcata* is a key dominant distinguishing this oak type from others. Braun (1950, p. 154-158) noted the prominence of *Quercus falcata* and *Quercus alba* on the low hills of the Mississippi Embayment Section of her Western Mesophytic Forest Region as well as in the Mississippian Plateau (TNC 1995a).

CONSERVATION RANKING & RARE SPECIES

GRank: G3G5 (1998-6-22): No information

High-ranked species: *Myotis sodalis* (G2)

ELEMENT DISTRIBUTION

Range: This dry-mesic southern red oak - mixed oak forest type is found in the central United States in the Interior Low Plateau region of Illinois, Indiana, and Kentucky. This community occupies narrow dry-mesic habitats within the Interior Low Plateau and Appalachian Plateau of Fenneman (1928).
Subnations: IL, IN?, KY, TN
TNC Ecoregions: 44:C
USFS Ecoregions: 222Ca:CP?, 222Ch:CP?, 222De:CCC, 222Di:CCP, 222E:CP
Federal Lands: USFS (Land Between the Lakes?, Shawnee)

ELEMENT SOURCES

References: Behler 1988, Braun 1950, Bull and Farrand 1977, Clark and Hutchinson 1994, Craighead 1949, Duncan and Duncan 1988, Evans 1991, Eyre 1980, Fenneman 1928, Fralish et al. 1991, Illinois Nature Preserve Commission 1973, Kuchler 1964, Little 1980, Midwestern Ecology Working Group n.d., Mohlenbrock 1986, Nelson 1985, Niering 1979, Robertson and Heikens 1994, Schwartz and Schwartz 1959, TNC 1985, TNC 1995a, Thornbury 1965, UNESCO 1973, Voigt and Mohlenbrock 1964, White and Madany 1978

WHITE OAK - MOCKERNUT HICKORY - (BLACK OAK) / NAKED-STEM TICK-TREFOIL - (PAINTED SEDGE) FOREST

ELEMENT IDENTIFIERS

NVC association: *Quercus alba - Carya alba - (Quercus velutina) / Desmodium nudiflorum - (Carex picta)* Forest
Database Code: CEGL007795
Formation: Lowland or submontane cold-deciduous forest (I.B.2.N.a)
Alliance: *Quercus alba - (Quercus rubra, Carya* spp.) Forest Alliance (A.239)

ELEMENT CONCEPT

Summary: This dry-mesic white oak - hickory forest is found in the Interior Low Plateau of Tennessee and adjoining states. Stands occur in dissected landscapes at low to moderate elevations (200-350 m; 600-1200 feet), on mid to lower slopes of various aspects, as well as toeslopes of gently convex form. Examples vary somewhat in expression on different aspects; however, the canopy is typically dominated by *Quercus alba* and *Carya alba*, with *Carya glabra* and *Quercus velutina*. *Quercus rubra* may be found in the subcanopy of some examples, particularly on north- and east-facing slopes. The subcanopy may also contain *Acer rubrum, Acer saccharum, Amelanchier arborea, Carpinus caroliniana, Nyssa sylvatica*, and *Oxydendrum arboreum*. *Vaccinium pallidum* may be a prominent low shrub in some examples, along with *Vaccinium stamineum* and *Viburnum acerifolium*. The herb dominance may be quite variable depending on aspect. Within its range, extensive carpets of *Carex picta* present a dramatic winter aspect dominance in south- or west-facing examples. In contrast, *Polystichum acrostichoides* may be equally dominant on north- or east-facing slopes. Some other herbs which may be found include *Cardamine angustata, Cynoglossum virginianum var. virginianum, Sanicula smallii*, and the fern *Asplenium platyneuron*.
Environment: Stands occur in dissected landscapes at low to moderate elevations (200-350 m; 600-1200 feet), on mid to lower slopes of various aspects, as well as toeslopes of gently convex form. Aspect may be an important factor in species composition of different stands attributable to this type.
Vegetation: The canopy is typically dominated by *Quercus alba* and *Carya alba*, with *Carya glabra* and *Quercus velutina*. *Quercus rubra* may be found in the subcanopy of some examples, particularly on north- and east-facing slopes. The subcanopy may also contain *Acer rubrum, Acer saccharum, Amelanchier arborea, Carpinus caroliniana, Nyssa sylvatica*, and *Oxydendrum arboreum*. *Sassafras albidum* was an important component of a plot attributed to this type form Fort Donelson (NatureServe Ecology unpubl. data). *Vaccinium pallidum* may be a prominent low shrub in some examples, along with *Vaccinium stamineum* and *Viburnum acerifolium*. The herb dominance may be quite variable depending on aspect. Within its range, extensive carpets of *Carex picta* present a dramatic winter aspect dominant in south- or west-facing examples. In contrast, *Polystichum acrostichoides* may be equally dominant on north- or east-facing slopes. Some other herbs which may be found include *Cardamine angustata, Cynoglossum virginianum var. virginianum, Sanicula smallii*, and the fern *Asplenium platyneuron*. Other species documented in plots include *Asimina triloba, Brachyelytrum erectum, Amphicarpaea bracteata, Cynoglossum virginianum*, and others (NatureServe Ecology unpubl. data).
Dynamics: No information
Similar Associations:
- *Quercus alba - (Quercus prinus) / Hydrangea quercifolia - Viburnum acerifolium / Carex picta - Piptochaetium avenaceum* Forest (CEGL008430)
- *Quercus alba - Quercus rubra - Carya (alba, ovata) / Cornus florida* Acid Forest (CEGL002067)
- *Quercus alba / Cornus florida* Unglaciated Forest (CEGL002066)
- *Quercus velutina - Quercus alba - Carya (glabra, ovata)* Forest (CEGL002076)

Related Concepts: No information

Classification Comments: This type was originally described from the Western Highland Rim of Tennessee, and is reported from Kentucky. This type could also be expected in adjacent Alabama, and possibly also from the adjacent Upper East Gulf Coastal Plain. It is also possible in Illinois and Indiana; however, in those two states the type may overlap in concept with *Quercus alba / Cornus florida* Unglaciated Forest (CEGL002066), and it may be that those stands should be removed from CEGL002066 and placed with this type. Alternatively, if this type can be white oak- and black oak-dominated, there may be some overlap with unglaciated stands placed in *Quercus velutina - Quercus alba - Carya (glabra, ovata)* Forest (CEGL002076). A similar association defined from the southern Cumberland Plateau, *Quercus alba - (Quercus prinus) / Hydrangea quercifolia - Viburnum acerifolium / Carex picta - Piptochaetium avenaceum* Forest (CEGL008430), is dominated by *Quercus alba* and *Quercus prinus*, with character species such as *Magnolia macrophylla* and *Hydrangea quercifolia*.

CONSERVATION RANKING & RARE SPECIES

GRank: G4 (1999-12-15): This is not an inherently rare forest type, and many examples are still extant. The lack of element occurrences of this type does not reflect its relative abundance. It is an extensive and widespread forest type within its range. This type is described from the Interior Low Plateau. Some stands have been impacted by removal of more valuable timber species (e.g., *Quercus alba*). There may be some loss of herbaceous species diversity from the disturbance effects of logging.
High-ranked species: No information

ELEMENT DISTRIBUTION

Range: This association is found from Kentucky and Tennessee north to Indiana and Illinois, possibly south to northern Alabama and northeastern Mississippi.
Subnations: AL?, IL, IN, KY, MS?, TN
TNC Ecoregions: 43:?, 44:C, 50:C
USFS Ecoregions: 221Ha:CCC, 221Hb:CCC, 221Hc:CCC, 221He:CCC, 222Cg:CPP, 222Ee:CCP, 222Ef:CCP, 222Eg:CCC, 222Eh:CCP, 222En:CCC, 222Eo:CCC, 231Be:???, M221Cd:CCC
Federal Lands: NPS (Fort Donelson, Natchez Trace); USFS (Daniel Boone, Land Between the Lakes)

ELEMENT SOURCES

References: NatureServe Ecology - Southeastern U.S. unpubl. data, Pyne 1997, Southeastern Ecology Working Group n.d.

WESTERN HIGHLAND RIM PRAIRIE AND BARRENS

ROCK CHESTNUT OAK / GREENBRIER SPECIES FOREST

ELEMENT IDENTIFIERS

NVC association: *Quercus prinus / Smilax* spp. Forest
Database Code: CEGL005022
Formation: Lowland or submontane cold-deciduous forest (I.B.2.N.a)
Alliance: *Quercus prinus - (Quercus coccinea, Quercus velutina)* Forest Alliance (A.248)

ELEMENT CONCEPT

Summary: This chestnut oak / greenbrier forest type is found in the Interior Low Plateau region of the United States. Stands occur on dry sandy, rocky, and gravelly, noncalcareous, thin to deep upland soils of steep mid and upper slopes of hills, bluffs and ridges. Aspect is generally southern and western. Bedrock is predominantly sandstone (sometimes chert), with boulders and rock fragments at or near the surface. The dominant tree species is *Quercus prinus*. A variety of other tree species may also be present such as *Quercus velutina, Carya ovalis, Quercus alba, Quercus coccinea*, and *Quercus stellata*. The understory of this type is poorly developed (less than 50% cover) and consists of scattered, open-grown trees and shrubs and vines, including *Vaccinium arboreum* and *Smilax rotundifolia*. Ground cover consists of mixed herbaceous species and is generally sparse (less than 20%). Typical herbaceous species include *Antennaria plantaginifolia* and *Danthonia spicata*. There may be an abundance of lichens (*Cladina subtenuis, Xanthoparmelia conspersa (= Parmelia conspersa)*) and mosses (*Leucobryum glaucum*) occurring on exposed rock and dead wood.
Environment: Stands occur on dry sandy, rocky, and gravelly, non-calcareous, thin to deep upland soils of steep mid and upper slopes of hills, bluffs and ridges. Aspect is generally southern and western. Bedrock is predominantly sandstone (sometimes chert), with boulders and rock fragments at or near the surface (TNC 1995a). This type occurs on Saffell soils in Stewart County, Tennessee, which are deep and well-drained silt loams formed in Coastal Plain gravelly materials. Because of the high content of gravel in these soils (up to 65% by volume), these sites have very low moisture-holding capacity and occur on the most xeric end of the moisture gradient at Land Between the Lakes (Fralish et al. 1999, Close et al. 2002). This type may occur on steep slopes (up to 60%) which are unstable due to movement of pebbles and rocks; the surface of some sites is heavily covered by white pebbles (Fralish et al. 1999).
Vegetation: Trees in this forest make their best growth on steep lower slopes of small spur ridges. Individual trees are medium in size (8-20 m), with open, spreading, and often irregularly shaped crowns. Canopy closure is around 80-90%. The dominant tree species is *Quercus prinus*, but a variety of other tree species may also be present (Fralish et al. 1999). These other species include

Quercus alba, Quercus velutina, Quercus coccinea, and *Carya ovalis*. The understory is poorly developed (less than 50% cover), possibly due to the droughty, nutrient-poor status of the soils. It may consist of scattered, open-grown trees and shrubs and vines, including *Vaccinium arboreum, Smilax rotundifolia, Sassafras albidum, Cornus florida, Fagus grandifolia, Ostrya virginiana*, and *Cercis canadensis*. Ground cover consists of mixed herbaceous species and is generally sparse (less than 20%), with an abundance of lichens and mosses occurring on exposed rock and dead wood. Typical herbaceous species include *Antennaria plantaginifolia* and *Danthonia spicata* (TNC 1995a). *Carex picta* can be important in examples of this type in the Brown County Hills Subsection of Indiana (Van Kley et al. 1995).

Dynamics: This community is heavily influenced by the droughty, nutrient-poor soils. In portions of its natural range, this community may have resulted from fire suppression in barrens and savannas (Fralish et al. 1999). Natural disturbance includes seasonal drought, wind damage, cyclic fire, and occasionally lightning strikes. Periodic fire encourages regeneration of oaks and hickories, and may contribute to poor development of the understory in this type. Where fire is suppressed, sugar maple and American beech can become invasive (TNC 1995a).

Similar Associations:

- *Quercus prinus - Quercus (alba, coccinea, velutina) / Viburnum acerifolium - (Kalmia latifolia)* Forest (CEGL005023) -- is an eastern Allegheny type which is perhaps less xeric.
- *Quercus prinus - Quercus* spp. / *Vaccinium arboreum - (Kalmia latifolia, Styrax grandifolius)* Forest (CEGL007700) -- which is a more dry-mesic and diverse forest found to the south of CEGL005023.

Related Concepts:

- *Quercus prinus - (Quercus coccinea) - Q. velutina/Smilax* spp. Forest (F86) (TNC 1995a) ?
- Black Oak: 110 (Eyre 1980) B
- Dry Sandstone Forest (White and Madany 1978) B
- Dry Upland Forest (White and Madany 1978) B Eastern Broadleaf Forests: 100: Oak-Hickory Forest (*Quercus-Carya*) (Kuchler 1964) B
- Gravel barrens community (Fralish et al. 1999) ?
- Terrestrial: Forest: Hardwood (TNC 1985) B
- UNESCO FORMATION CODE: I.B.3a (UNESCO 1973)

Classification Comments: In Illinois, *Smilax* spp. are not as common as in Indiana. Some stands may have more of a mixed oak component. Type is also found in the Shawnee Hill region of Kentucky. Distribution of this type in the Southeast needs to be assessed. A subtype occurs in the Ozark Hills of southern Illinois where *Quercus prinus* and *Quercus velutina* codominate stands. *Cornus florida, Amelanchier arborea, Sassafras albidum*, and *Ostrya virginiana* are typical shrub and small tree components. This subtype may in fact belong to the *Quercus velutina - Quercus prinus - Carya* spp. Ozark Forest found in Missouri and Arkansas (TNC 1995a).

CONSERVATION RANKING & RARE SPECIES

GRank: G3G5 (1998-6-22): No information

High-ranked species: No information

ELEMENT DISTRIBUTION

Range: This chestnut oak / greenbrier forest type is found in the Interior Low Plateau region of the United States, ranging from southern Illinois east to southern Ohio and south to Kentucky and possibly Tennessee. This community occurs on dry, rocky, and gravelly upper slopes and ridgetops where soil chemistry is affected by acidic bedrock. Occurrences can be large as chestnut oak and black oak are dominant species on dry uplands east of the Mississippi River.

Subnations: IL, IN, KY, OH?, TN

TNC Ecoregions: 38:C, 44:C, 50:?

USFS Ecoregions: 221D:PP, 221Ec:PPP, 221Ed:PPP, 221Ef:PPP, 221H:PP, 221I:PP, 222Aq:CCC, 222Da:CCP, 222Db:CCC, 222Dc:CCP, 222De:CCC, 222Dg:CCP, 222Dh:CCP, 222Dj:CCP, 222Ei:CCC, 222Ek:CCP, 222El:CCC, 222Em:CCC, 231A:PP, 231C:PP, 231D:PP, M221A:PP, M221C:P?

Federal Lands: DOD (Fort Knox); USFS (Land Between the Lakes)

ELEMENT SOURCES

References: Behler 1988, Bull and Farrand 1977, Clark and Hutchinson 1994, Close et al. 2002, Craighead 1949, Duncan and Duncan 1988, Evans 1991, Eyre 1980, Fralish et al. 1999, Illinois Nature Preserve Commission 1973, Kuchler 1964, Little 1980, Midwestern Ecology Working Group n.d., Mohlenbrock 1986, Nelson 1985, Niering 1979, SAF 1967, Schwartz and Schwartz 1959, TNC 1985, TNC 1995a, Thornbury 1965, UNESCO 1973, Van Kley et al. 1995, Voigt and Mohlenbrock 1964, White and Madany 1978

TENNESSEE VALLEY IMPOUNDMENT MUD FLAT VEGETATION

ELEMENT IDENTIFIERS

NVC association: Tennessee Valley Impoundment Mud Flat Vegetation
Database Code: CEGL004049
Formation: Seasonally / temporarily flooded mud flats (VII.C.4.N.c)
Alliance: Non-tidal Mud Flat Seasonally/Temporarily Flooded Sparsely Vegetated Alliance (A.1878)

ELEMENT CONCEPT

Summary: This association represents shoreline vegetation typical of large mainstream and tributary reservoirs in western Tennessee and adjacent areas. This type occurs on sites which are subject to high water levels and complete inundation for much of the year, but are drawn down in the early to middle summer. Lake margins with suitable substrate (generally silt or clay) are colonized by a variety of plant species adapted to intermittent inundation and saturated soils that are capable of completing their life cycle in a compressed growing season between drawdown and frost (Webb et al. 1988). The composition and structure of the vegetation is highly variable between locations and between different years. In general, a number of short-statured annuals are characteristic. These include *Rotala ramosior, Lindernia dubia, Fimbristylis autumnalis, Eragrostis hypnoides, Lipocarpha micrantha (= Hemicarpha micrantha), Eleocharis obtusa, Fimbristylis miliacea,* and others. Several perennial species may also be encountered, especially along the upper edges and boundaries of the mudflats. Species can include *Alternanthera philoxeroides, Symphyotrichum lanceolatum var. lanceolatum (= Aster simplex), Juncus acuminatus, Justicia americana, Leersia oryzoides, Ludwigia* spp., *Panicum agrostoides,* and others.
Environment: This association is typical of large mainstream and tributary reservoirs in western Tennessee and adjacent areas, including Alabama and Kentucky and possibly other states. These areas are subject to high water levels and complete inundation for much of the year, but are subject to drawdown in the early to middle summer (Webb et al 1988). Substrate includes silt and clay.
Vegetation: The composition and structure of the vegetation is highly variable between locations and between different years. The flora of these sites has been well documented by Webb et al. (1988). In general, a number of short-statured annuals are characteristic. These include *Rotala ramosior, Lindernia dubia, Fimbristylis autumnalis, Eragrostis hypnoides, Lipocarpha micrantha (= Hemicarpha micrantha), Eleocharis obtusa, Fimbristylis miliacea,* and others. Several perennial species may also be encountered, especially along the upper edges and boundaries of the mudflats. Species can include *Alternanthera philoxeroides, Symphyotrichum lanceolatum var. lanceolatum (= Aster simplex), Juncus acuminatus, Justicia americana, Leersia oryzoides, Ludwigia* spp., *Panicum rigidulum (= Panicum agrostoides),* and others.
Dynamics: Annual drawdown and inundation are the primary processes affecting this community.
Similar Associations:
Related Concepts: No information
Classification Comments:

CONSERVATION RANKING & RARE SPECIES

GRank: GNR (2004-4-21): No information
High-ranked species: No information

ELEMENT DISTRIBUTION

Range:
Subnations: AL, KY, TN
TNC Ecoregions: 43:P, 44:C
USFS Ecoregions: No information
Federal Lands: NPS (Fort Donelson); USFS (Land Between the Lakes?)

ELEMENT SOURCES

References: NatureServe Ecology - Southeastern U.S. unpubl. data, Southeastern Ecology Working Group n.d., Webb et al. 1988

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