

**INTERNATIONAL ECOLOGICAL
CLASSIFICATION STANDARD:
TERRESTRIAL ECOLOGICAL CLASSIFICATIONS**

Francis Marion National Forest Final Report

April 30, 2004

by

NatureServe

1101 Wilson Blvd., 15th floor
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This subset of the International Ecological Classification Standard covers vegetation associations and alliances attributed to the Francis Marion National Forest (South Carolina). 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 or Carl W. Nordman carl_nordman@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:

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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, Query 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-Departamento 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, as well as original data collected by NatureServe and others.

This classification subset includes all alliances and associations attributed to the Francis Marion National Forest (South Carolina), as well as some that are thought to occur on those forests 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. The fieldwork on the Francis Marion National Forest took place primarily in 2002 and 2003. Field reconnaissance and/or plot data collection was conducted in coordination with U.S. Forest Service personnel with the objective of visiting representative examples of all the major vegetation types, rare or unusual communities, and vegetation resulting from common forest management regimes. In many cases, the composition of representative vegetation at these sites was quantified through the establishment of standardized vegetation plots.

The vegetation classification produced through this agreement forms the foundation for continuing use of the USNVC on U.S. Forest Service lands in Region 8 for natural resource planning and management. The classification continues to rely on feedback and additional fieldwork to improve its coverage of the individual Forest unit. Future refinements, revisions, and additions will be made to this classification based on review by Forest Service personnel, review of other vegetation studies, and analysis of data collected during field reconnaissance. 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) or Carl W. Nordman: 919-484-7857 x153 (carl_nordman@natureserve.org).

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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 IECS 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., Rübél 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.

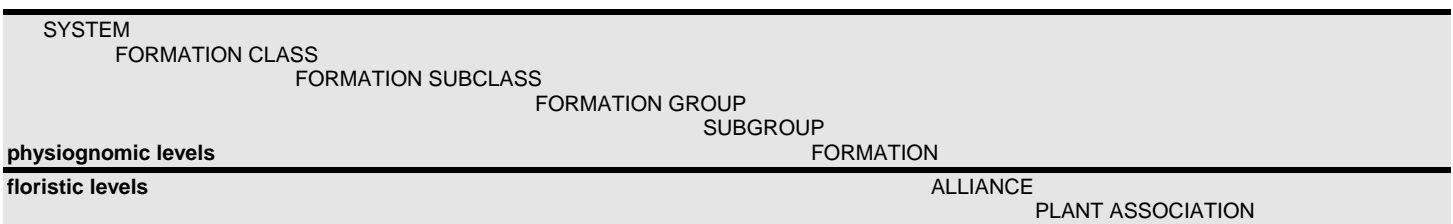


TABLE 1. HIERARCHICAL VEGETATION CLASSIFICATION SYSTEM FOR TERRESTRIAL ECOLOGICAL COMMUNITIES. (Examples)

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	<i>Quercus stellata</i> - <i>Quercus marilandica</i> Forest Alliance	<i>Pinus palustris</i> Saturated Woodland Alliance	<i>Quercus havardii</i> Shrubland Alliance
ASSOCIATION	<i>Quercus stellata</i> - <i>Quercus marilandica</i> - <i>Carya (glabra, texana)</i> / <i>Vaccinium arboreum</i> Forest	<i>Pinus palustris</i> / <i>Leiophyllum buxifolium</i> / <i>Aristida stricta</i> Woodland	<i>Quercus havardii</i> - (<i>Penstemon ambiguus</i> , <i>Croton dioicus</i>) / <i>Sporobolus giganteus</i> 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, parenthetical species are always placed following nonparenthetical (more constant) species. If more than one species in a stratum is parenthetical, 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 used 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 USDA 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 the 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 its 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 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 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

ECOLOGICAL SYSTEM

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 or Carl W. Nordman: carl_nordman@natureserve.org.

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ALLIANCES BY US NATIONAL VEGETATION CLASSIFICATION HIERARCHY

I. Forest

IA.4.N.a. Lowland temperate seasonal evergreen forest

IA.4.N.A. *QUERCUS VIRGINIANA* - (*SABAL PALMETTO*) FOREST ALLIANCE (A.55) LIVE OAK - (*CABBAGE PALMETTO*) FOREST ALLIANCE

ALLIANCE CONCEPT

Summary: This alliance includes communities of barrier islands, maritime hammocks, and some more inland coastal hammocks and other fire-protected situations, which are dominated and characterized by *Quercus virginiana*, and often containing *Sabal palmetto* and *Juniperus virginiana* var. *silicicola* within their ranges. Habitats for associations in this alliance range from xeric and subxeric to moist. Vegetation of this alliance most typically lies just landward of maritime shrub zones; it ranges from temperate to subtropical and often has a component of deciduous broad-leaved trees as well, particularly in the north. Some examples are affected by varying intensities of salt spray; these situations display more-or-less wind- and salt spray-sculpted vegetation. Other upland examples are not affected by salt spray and correspondingly differ in composition and stature. Composition varies along a latitudinal gradient. Examples occur on sand flats, lower slopes, and on stabilized dunes that are protected from saltwater flooding but which experience light to moderate salt spray. Some more protected examples have relatively closed and diverse canopies and well-developed shrub strata; vines are often conspicuous and abundant, but the herbaceous stratum is typically sparse and low in diversity. This community occurs over moist, sandy soils, on low areas of the mainland coast, and stands are protected from the most extreme maritime influences (i.e., salt spray) but are susceptible to high winds and flooding during hurricanes. Extending south from the vicinity of Cape Fear, North Carolina, the canopy is dominated by *Quercus virginiana* and *Pinus taeda* with some *Sabal palmetto*. Farther south, *Pinus elliottii* var. *elliottii* replaces *Pinus taeda*, and *Sabal palmetto* becomes more prominent. In mid-Florida, tropical species begin to dominate the understory while temperate species retain canopy dominance. South of Martin County, Florida, tropical species such as *Bursera simaruba*, *Sideroxylon foetidissimum*, and *Ficus aurea* begin to dominate the forest canopy. The more tropically influenced examples may contain shrubs such as *Eugenia axillaris*, *Myrsine floridana*, and *Coccoloba uvifera* on the west coast of Florida, and *Myrcianthes fragrans*, *Ardisia escallonoides*, and *Psychotria nervosa* on the east coast. The alliance also includes tropical/temperate maritime hammocks of the east coast of Florida, in mid-peninsula, characteristically with oak canopy and tropical subcanopy; as well as temperate maritime hammocks of the northeast and Panhandle coasts of Florida. Vegetation of this alliance may be found on xeric to mesic sites, often occurring as linear strands behind frontal dunes. The seaward edge is generally found on the leeward side of dune complexes which provide shelter from excessive salt spray and overwash; this vegetation is also found on top of relict dune ridges and other areas with xeric to mesic hydrology. While relatively protected, the vegetation frequently exhibits effects of wind-pruning and salt spray. The alliance also includes some dry hammocks, found from Florida to North Carolina; in these examples, *Quercus virginiana* is dominant, and sometimes *Juniperus virginiana* var. *silicicola* is present in the canopy. Frequently small *Cladina* - *Cladonia*-dominated openings are present. On small hammocks in salt marshes, *Juniperus virginiana* var. *silicicola*, *Baccharis halimifolia*, and *Morella cerifera* are characteristic. Another type of xeric hammock contains *Serenoa repens* under a *Quercus virginiana* canopy. On Amelia Island, Florida, *Magnolia grandiflora* is characteristically in the understory, increasing after cutting or with a greater shell content in the soil. Some Mississippi vegetation included here is found on coastal sand ridges along inlets of marsh channels.

Related Concepts:

- Cabbage Palmetto: 74 (Eyre 1980) I
- IA9a. Mid-Atlantic Barrier Island Forest (Allard 1990) I
- IA9b. South Atlantic Inland Maritime Forest (Allard 1990) I
- IA9c. Mid-Atlantic Inland Maritime Forest (Allard 1990) I
- IA9d. South Atlantic Barrier Island Forest (Allard 1990) ?
- Interdune Forest (Ambrose 1990a) ?
- Live Oak: 89 (Eyre 1980) I
- Maritime Evergreen Forest (Schafale and Weakley 1990) I
- Maritime Forest (Nelson 1986) I
- Maritime Hammock (FNAI 1990) I
- Maritime Hammock (FNAI 1992a) I Maritime Strand Forest (Ambrose 1990a) ?
- Oak-bay forest (Sharitz 1975) ?
- Upland Maritime Forest (Ambrose 1990a) ?
- Xeric Hammock (FNAI 1992a) ?
- Xeric Hammock, Sandhill Hammock subtype (FNAI 1992b) ?

Classification Comments: None

ALLIANCE DISTRIBUTION

Range: This alliance is found in Alabama, Florida, Georgia, Louisiana, Mississippi (?), North Carolina, South Carolina, and Virginia.

Subnations: AL, FL, GA, LA, MS, NC, SC, TX, VA

TNC Ecoregions: 31:C, 53:C, 54:P, 55:C, 56:C, 57:C, 58:?

USFS Ecoregions: 232Bc:CCC, 232Be:CCC, 232Bf:CCC, 232Bg:CCC, 232Bh:CCC, 232Bi:CCP, 232Bj:CCC, 232Bo:CC?, 232Bp:CCP, 232Ca:CCC, 232Cb:CCC, 232Cc:CCP, 232Ce:CCC, 232Cf:CC?, 232Ch:CCC, 232Ci:CCC, 232Db:CCC, 232Dc:CCC, 232Dd:CCC, 232De:CCC, 232Ed:CCC, 232Ga:CCP, 232Gb:CCC, 232Gc:CCP, 232Gd:CCP

Federal Lands: DOD (Cape Canaveral, Eglin, Tyndall?); NPS (Cumberland Island, Fort Pulaski); USFS (Apalachicola, Croatan, De Soto, Francis Marion, Ocala, Osceola); USFWS (Blackbeard Island?, Bon Secour, Cape Romain, Lake Woodruff?, Merritt Island?, Swanquarter?, Wassaw?, Wolf Island?)

ALLIANCE SOURCES

References: Abrahamson et al. 1984, Allard 1990, Ambrose 1990a, Austin and Coleman-Marois 1977, Bellis 1992, Bourdeau and Oosting 1959, Clewell 1971, Duever and Brinson 1984b, Eyre 1980, FNAI 1990, FNAI 1992a, FNAI 1992b, Gaddy 1981, Godfrey 1976, Harshberger 1914, Hillestad et al. 1975, Johnson and Barbour 1990, Johnson et al. 1974, Johnson et al. 1990b, Kurz 1942, LeGrand et al. 1992, Nelson 1986, Platt and Schwartz 1990, Rayner 1984, Rayner and Batson 1976, Sandifer et al. 1980, Schafale and Weakley 1990, Sharitz 1975, South Carolina Wildlife and Marine Resources Department 1984, Wentworth et al. 1993, Wharton 1978

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:CCP, 231Cd:CCP, 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 PALUSTRIS PLANTED FOREST ALLIANCE (A.96) LONGLEAF PINE PLANTED FOREST ALLIANCE

ALLIANCE CONCEPT

Summary: This alliance includes young, monospecific plantation stands of *Pinus palustris*. These are cultivated forests which do not represent or approximate natural or near-natural vegetation structure. They are maintained as plantations for the harvest of forest products (usually poletimber). The core concept of these stands are those which are mechanically planted to dense, often perfect rows of planted *Pinus palustris* or otherwise dense, young stands which are managed and maintained for the extraction of forest products. Stands are typically established with mechanical planting, but may also be established through other means. In most cases these stands support almost no other tree species in the overstory, and typically very little understory. This alliance rarely exceeds 20-40 years of age on most timberlands. Excluded from this alliance are areas where longleaf pine has been planted in ways that maintain natural ground layer components (such as hand planting with no mechanical site preparation), as well as areas which originated as mechanically planted, dense stands but which have been thinned and burned or have "broken up" with age allowing for restoration of some natural ground cover components and a canopy structure approximating that of natural longleaf pine communities. Most stands in this alliance are created after clear-cutting of natural stands and mechanical site preparation to reduce or eliminate competition for planted pine seedlings. Dense planting in rows, if successful, tends to result in nearly complete canopy closure which persists until the stand has been "thinned" twice, at which time some openings in the canopy are created which may allow some sunlight to the ground layer. 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. Moreover, 'natural' ground layer vegetation is especially lacking. In North and South Carolina, pinestraw is commonly harvested from these forests, often further damaging the ground cover.

Related Concepts:

- Longleaf Pine: 70 (Eyre 1980) I

Classification Comments: The core concept of these stands are those which are mechanically planted to dense, often perfect rows of planted *Pinus palustris* or otherwise dense, young stands which are managed and maintained for the extraction of forest products. Stands are typically established with mechanical planting, but may also be established through other means. Excluded from this alliance are areas where longleaf pine has been planted in ways that maintain natural ground layer components (such as hand planting with no mechanical site preparation), as well as areas which originated as mechanically planted, dense stands but which have been thinned and burned or have "broken up" with age allowing for restoration of some natural ground cover components and a canopy structure approximating that of natural longleaf pine communities.

ALLIANCE DISTRIBUTION

Range: This alliance is found in Alabama, Florida, Georgia, Louisiana, Mississippi, North Carolina, South Carolina, and Texas.

Subnations: AL, FL, GA, LA, MS, NC, SC, TX

TNC Ecoregions: 40:C, 41:C, 43:P, 50:P, 53:C, 55:P, 56:P, 57:P

USFS Ecoregions: 231Ca:PPP, 231Cd:PPP, 232Bq:CCC, 232Br:CCC, 232Ca:CCC, 232Cb:CCC, 232F:CC

Federal Lands: DOD (Fort Benning, Fort Bragg, Fort Gordon, Fort Stewart); DOE (Savannah River Site); USFS (Angelina, Apalachicola, Bankhead?, Croatan?, Francis Marion, Kisatchie, Ocala?, Osceola, Sabine NF, Sumter?, Talladega?, Tuskegee?)

ALLIANCE SOURCES

References: Eyre 1980

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

I.A.8.N.B. PINUS PALUSTRIS - (PINUS ELLIOTTII) FOREST ALLIANCE (A.123) LONGLEAF PINE - (SLASH PINE) FOREST ALLIANCE

ALLIANCE CONCEPT

Summary: This alliance accommodates flatwoods and other mesic Coastal Plain environments dominated by mixtures of *Pinus palustris* and *Pinus elliotii* var. *elliottii*. This includes a variety of situations, for example dense, fire-suppressed *Pinus elliotii* var. *elliottii* plantations and old-field stands, on former *Pinus palustris* sites, with a remnant semi-natural ground layer; in addition to other silviculturally manipulated stands, such as forests resulting from planting or regeneration of *Pinus elliotii* var. *elliottii* from seed trees. Examples of this alliance are generally silviculturally managed, so some examples at particular times may exhibit canopy coverage below the 60% cover limit for a forest, but all examples are conceptually included here. Burning frequencies for management purposes are generally increased in older stands (greater than 15 years of age).

Examples of this alliance in the West Gulf Coastal Plain include stands which are old plantations planted outside the natural range of *Pinus elliotii* var. *elliottii*, sometimes on former *Pinus palustris* sites. In this region, the local expression of this alliance depends on soil conditions. In mesic to dry-mesic uplands, the canopy may range from nearly pure *Pinus elliotii* (possibly with some *Pinus taeda* ingrowth) to a mixed canopy containing *Pinus elliotii* var. *elliottii* and *Pinus palustris* in combination. In the former case, soils are generally acidic silt loams and sandy loams; in the latter case they tend to be well-drained to moderately well-drained fine sandy loams and sands underlain by clay. The understory and herbaceous strata vary depending on management, site conditions, and canopy coverage; the tall-shrub stratum ranges from fairly dense to sparse, and may be patchy. In the Inner Coastal Plain of South Carolina (Savannah River Site), mature upland plantations in this alliance tend to develop an understory including *Nyssa sylvatica* and an

herbaceous stratum dominated by *Rubus argutus*. In contrast, burned examples tend to have *Prunus serotina* var. *serotina* in the understory and *Andropogon virginicus* in the herbaceous layer.

Related Concepts:

- IF3b. Plantation (Hardwood or Conifer) (Allard 1990) I
- Loamy Hills Longleaf - Slash Pine Forest (Wieland 1994b) I
- Longleaf - Slash Pine Forest (Wieland 1994b) I
- Longleaf Pine - Slash Pine: 83 (Eyre 1980) I

Classification Comments: Associations on the Kisatchie, Angelina, and Sabine national forests are former plantations that are out of the natural range of *Pinus elliottii* var. *elliottii*. This alliance contains managed forests which are manipulated through silvicultural techniques such as burning and thinning. Initially planted as a seedling/sapling phase, they progress relatively quickly (9-12 years) to a forest physiognomy. See also the *Pinus elliottii* Planted Forest Alliance (A.95), for these younger stands are likely to be cut before succeeding to other vegetation types.

ALLIANCE DISTRIBUTION

Range: This alliance is found in the Coastal Plain of the United States in Alabama, Florida, Georgia, Louisiana, Mississippi, North Carolina, South Carolina, and Texas.

Subnations: AL, FL, GA, LA, MS, NC, SC, TX

TNC Ecoregions: 41:C, 53:C, 55:C, 56:C, 57:C

USFS Ecoregions: 232Ba:CCC, 232Be:CCC, 232Bf:CCC, 232Bg:CCC, 232Bh:CCC, 232Bi:CCC, 232Bj:CCC, 232Bk:CCC, 232Bn:CC?, 232Bo:CCP, 232Bp:CCP, 232Bq:CCP, 232Br:CCC, 232Bu:CC?, 232Bv:CC?, 232Ca:CCP, 232Cb:CCP, 232Cc:CCP, 232Cd:CCP, 232Ce:CCC, 232Cf:CCP, 232Db:CCC, 232Dc:CCC, 232Dd:CCP, 232Fa:CCC, 232Fb:CCC, 232Fe:CCC, 232Ga:C??

Federal Lands: DOD (Eglin, Fort Bragg); DOE (Savannah River Site); NPS (Big Thicket); USFS (Angelina, Apalachicola, Conecuh, Croatan, Davy Crockett, De Soto, Francis Marion, Kisatchie, Sabine NF, Sam Houston?, Tuskegee?); USFWS (St. Marks)

ALLIANCE SOURCES

References: Allard 1990, Clewell 1981, Eyre 1980, Jones et al. 1981b, Pearson et al. 1987, Quarterman and Keever 1962, Smith pers. comm., Wieland 1994b

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

**I.B.2.N.A. FAGUS GRANDIFOLIA - QUERCUS ALBA FOREST ALLIANCE (A.228)
AMERICAN BEECH - WHITE OAK FOREST ALLIANCE**

ALLIANCE CONCEPT

Summary: This alliance includes southern mixed hardwood forests with admixtures of *Quercus alba* and *Fagus grandifolia*. Associations in this alliance include dry-mesic to mesic forests that typically occur on slopes and small stream bottoms in the Coastal Plain, and also in other adjacent physiographic provinces, including the southern part of Crowley's Ridge, Arkansas, and the Piedmont. This alliance is distributed primarily north of the distribution of *Magnolia grandiflora*, but may also include stands within this range which lack a *Magnolia grandiflora* component. A diverse, often dense canopy is usually present, which may include *Liriodendron tulipifera*, *Liquidambar styraciflua*, *Quercus michauxii*, *Quercus pagoda*, *Carya cordiformis*, *Fraxinus americana*, and *Ulmus* spp. In the southern part of the range, examples of this alliance may have *Acer barbatum* and *Acer leucoderme* in the subcanopy. A widely variable understory and shrub layer is usually present. Although the herbaceous layer is typically sparse, it may contain a number of species restricted, or nearly so, to rich mesic habitats.

Related Concepts:

- *Fagus grandifolia* forest alliance (Hoagland 1998a) ?
- American Beech - White Oak / *Mitchella* Loamy Moist-Mesic Steep Slopes and Ravines (Turner et al. 1999) I
- American Beech-Southern Magnolia Series (Diamond 1993) I
- American Beech-White Oak Series (Diamond 1993) ?
- Basic Mesic Forest, Coastal Plain Subtype (Schafale and Weakley 1990) ?
- Basic Mesic Forest, Piedmont Subtype (Schafale and Weakley 1990) ?
- Beech-Sweet Gum-Tulip Poplar MAP (Pyne 1994) ?
- Calcareous Forest (Smith 1996a) I
- Calcareous mesophytic forest (Evans 1991) I
- Coastal Plain Beech Forest (Foti 1994b) ?
- Coastal Plain mesophytic cane forest (Evans 1991) I
- Deep soil mesophytic forest (Evans 1991) I
- Hardwood Slope Forest (Smith 1996a) I
- IA8b. Coastal Plain Calcareous Forest (Allard 1990) I
- IA8d. Southern Mixed Hardwood Forest (Allard 1990) I
- Mixed Mesophytic Forest (Foti 1994b) I
- Piedmont Mesic Broad-leaved Deciduous Forest (Ambrose 1990a) ?

- Piedmont/Coastal Plain Heath Bluff (Schafale and Weakley 1990) I
- T1B2a1a. *Fagus grandifolia* - *Ilex opaca* (Foti et al. 1994) ?

Classification Comments: This alliance presumably forms the core of the "Southern Mixed Hardwoods" of Monk et al. (1989). Although they recognized two subgroups within this type, these appear to be broader concepts than most associations as currently defined.

ALLIANCE DISTRIBUTION

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

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

TNC Ecoregions: 40:C, 41:C, 42:C, 43:C, 52:C, 53:C, 56:?, 57:C, 58:C

USFS Ecoregions: 222Ao:C??, 222Cb:CCP, 222Cc:CCC, 222D:C?, 231Aa:CCC, 231Ae:CCP, 231Af:CCC, 231Ba:CCP, 231Bc:CCC, 231Bd:CCC, 231Be:CCP, 231Bf:CCP, 231Bg:CCP, 231Bh:CCC, 231Bi:CCP, 231Bj:CCP, 231Cd:CCP, 231Ea:CCC, 231Eb:CCP, 231Ed:CCC, 231Ej:CCP, 231Ek:CCP, 232A:CC, 232Ba:CCP, 232Bb:CCC, 232Bc:CCP, 232Bd:CCC, 232Be:CCP, 232Bf:CCP, 232Bg:CCC, 232Bh:CCP, 232Bi:CCP, 232Bj:CCP, 232Bk:CCP, 232Bl:CCC, 232Bm:CCP, 232Bn:CCC, 232Bq:CCC, 232Br:CCC, 232Bs:CCC, 232Bu:CCP, 232Bv:CCP, 232Ca:CCC, 232Cb:CCC, 232Cf:CCC, 232Ch:CC?, 232Ea:CCC, 232Fa:CCC, 232Fb:CCP, 232Fe:CCC, 234Aa:CCC, 234Ab:CCC, 234Ad:CCP, 234An:CC?

Federal Lands: COE (Claiborne Lake); DOD (Fort Benning, Fort Stewart); NPS (Colonial, Congaree Swamp, Kings Mountain); USFS (Angelina, Apalachicola, Bienville, Conecuh, Croatan, De Soto, Francis Marion, Homochitto, Kisatchie, Ouachita?, Sabine NF, Sam Houston?, St. Francis, Talladega, Tombigbee, Tuskegee); USFWS (Lake Isom)

ALLIANCE SOURCES

References: Allard 1990, Ambrose 1990a, Clark 1974, Clark 1977c, Diamond 1993, Evans 1991, Foti 1994b, Foti et al. 1994, Frost et al. 1990, Hill 1992, Hoagland 1998a, Martin and Smith 1991, Monk 1965, Monk et al. 1989, Pyne 1994, Quarterman and Keever 1962, Rice and Peet 1997, Schafale and Weakley 1990, Smith 1996a, Soblo 1989, Turner et al. 1999, Ware 1970, Ware 1988, Ware and Ware 1992

I.B.2.N.A. *QUERCUS SHUMARDII* - *QUERCUS PAGODA* FOREST ALLIANCE (A.252) SHUMARD OAK - CHERRYBARK OAK FOREST ALLIANCE

ALLIANCE CONCEPT

Summary: This alliance includes mesic upland forests of the Coastal Plain, which occur over calcareous substrates as well as over loess deposits. The canopies of stands are typically dominated by some combination of *Quercus shumardii*, *Quercus pagoda*, *Quercus muehlenbergii*, *Quercus michauxii*, *Fraxinus americana*, *Acer barbatum*, *Liquidambar styraciflua*, *Ulmus* spp., and *Carya* spp. Stands may also contain *Magnolia acuminata*, *Magnolia grandiflora*, *Liriodendron tulipifera*, *Quercus falcata*, *Fagus grandifolia*, *Gleditsia triacanthos*, *Diospyros virginiana*, *Tilia americana*, *Morus rubra*, *Juniperus virginiana* var. *virginiana*, and *Pinus taeda*. The somewhat rare *Carya myristiciformis* may be present within its range. As presently circumscribed, this alliance includes rich forests of lower slopes above cypress or bottomland hardwood forests, as well as oak or oak-hardwood forests adjacent to Keiffer Prairies or Jackson Prairies of Louisiana, as well as other poorly-known and unusual forests over limestones or other basic to circumneutral strata in the East Gulf Coastal Plain and Upper East Gulf Coastal Plain.

The mesic calcareous forests associated with Jackson Prairies in Louisiana contain a dense canopy dominated by *Quercus shumardii*, *Quercus pagoda*, and *Fraxinus americana*, with *Liquidambar styraciflua*, *Magnolia acuminata*, *Liriodendron tulipifera*, *Quercus phellos*, *Quercus michauxii*, *Acer barbatum*, *Quercus muehlenbergii*, *Platanus occidentalis*, and *Pinus taeda*. The open to fairly dense subcanopy contains *Ostrya virginiana*, *Cornus florida*, *Acer barbatum*, *Asimina triloba*, *Ulmus alata*, *Frangula caroliniana*, *Zanthoxylum clava-herculis*, *Cercis canadensis*, *Hamamelis virginiana*, and *Sideroxylon lanuginosum*. The sparse shrub and woody vine layer includes *Bignonia capreolata*, *Aesculus pavia* var. *pavia*, *Rhus aromatica*, *Cocculus carolinus*, *Berchemia scandens*, and *Arundinaria gigantea* ssp. *gigantea*. The sparse herb layer includes *Carex cherokeensis*, *Lithospermum tuberosum*, *Botrychium virginianum*, *Aristolochia serpentaria*, *Delphinium carolinianum*, *Dioscorea quaternata*, *Trillium ludovicianum*, *Podophyllum peltatum*, *Polygonatum biflorum*, *Passiflora lutea*, *Phryma leptostachya*, *Spigelia marilandica*, *Taenidia integerrima*, *Phlox divaricata*, and *Smilax herbacea*. More information is needed on the composition and dynamics of this alliance outside of Louisiana.

In Kentucky, vegetation of this alliance occurs in the Upper East Gulf Coastal Plain on lower toe slopes above cypress or bottomland hardwood forests. Typical canopy trees include *Quercus phellos*, *Quercus michauxii*, *Quercus pagoda*, *Quercus falcata*, and *Quercus stellata*. These are often mixed with swamp species like *Quercus palustris* and upland forest species like *Quercus alba*. At these Kentucky sites, flooding occurs in winter, and groundwater probably remains high through most years, but upper soil horizons may become relatively dry in the summer.

Related Concepts: No information

Classification Comments: MP 2001-04-11: Stands are reported by Tom Govus from Broken Arrow Creek (Russell County, Alabama, directly across the Chattahoochee River from Georgia) which possibly should be placed here. Data from TG: "The stand is

dominated by *Quercus muehlenbergii* and *Quercus shumardii*. The canopy also contains *Quercus pagoda*, *Fagus grandifolia*, *Quercus rubra*, *Carya alba* and *Fraxinus americana*. The subcanopy contains *Halesia tetraptera*, *Ulmus alata*, *Acer leucoderme*, *Cercis canadensis*, *Cornus florida*, and *Ostrya virginiana*. Shrubs include *Staphylea trifolia*, *Acer leucoderme*, *Hydrangea quercifolia*, *Ulmus alata*, and *Aesculus pavia*. Herbs include *Polystichum acrostichoides*, *Chasmanthium laxum* (dominant?), and *Solidago auriculata*. These are very short bluffs adjacent to the river and extending up Broken Arrow Creek (along the north aspect portions). Chris Oberholster has recently informed me that the substrate is the Blufftown Formation which includes a calcareous sand (!!!!). There is quite a bit of clay mining for bricks to the north and it may be that this forest is on calcareous clay." Additional info from TG 2001-04-12: "According to Chris Oberholster, the substrate is the Blufftown Formation which includes calcareous clays and sands. It is definitely a sticky, heavy clay which I assume was deposited by the Chattahoochee and perhaps cut into by Broken Arrow Creek to create this 1 mile +, linear, steep short bluff. The community composition described by the *Quercus shumardii* - *Quercus pagoda* Forest Alliance indeed hits the nail on the head. I now have an idea about the herbaceous layer which includes: *Phlox divaricata*, *Amsonia tabernaemontana*, *Trillium decipiens*! (perhaps an ecological equivalent to *Trillium ludovicianum*?), *Cynoglossum virginianum*, *Zephyranthes atamasca*, *Solidago auriculata*, *Lithospermum tuberosum*, *Nothoscordum bivalve*, *Geranium maculatum*, *Hepatica nobilis* var. *obtusata*, and many others - quite diverse. It seems like an unusual enough community to be worth the effort. If you ever can ever decide on an Association that you like for it please let me know. I would assume it to have a high Grank." *Juniperus virginiana* - *Fraxinus americana* - *Quercus shumardii* Forest Alliance (A.381) was in effect a mixed variant of A.252 (with *Juniperus*); it has now been merged (MP 2001-04).

ALLIANCE DISTRIBUTION

Range: This alliance is found in Alabama, Arkansas (?), Georgia, Kentucky, Mississippi, Louisiana, South Carolina, and Tennessee. One association also presumably ranges into eastern Texas.

Subnations: AL, AR, GA?, KY, LA, MS, OK?, SC, TN, TX?

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

USFS Ecoregions: 222Cb:CCC, 222Cc:CCP, 222Ce:CCP, 222Cg:CCC, 231Bd:CCC, 231Be:CC?, 231Bg:CCP, 231Bh:CCP, 231Bi:CCP, 231Ea:CCP, 231Eb:CCC, 231Ej:CCC, 232Ba:CCP, 232Bb:CCP, 232Bd:CCP, 232Bj:CCP, 232Bl:CCC, 232Cb:CCC, 232Dc:C??, 232Fa:CCC, 234Ah:???, 234Ak:???, 234Al:???, 234An:???

Federal Lands: COE (Bayou Bodcau); DOD (Barksdale, Fort Benning, Fort Polk); NPS (Fort Donelson, Shiloh); USFS (Angelina, Davy Crockett, Francis Marion, Holly Springs?, Kisatchie, Sabine NF, Sam Houston)

ALLIANCE SOURCES

References: Allen 1993a, Martin and Smith 1991, Patterson et al. 1994, Smith et al. 1989, Wieland 2000a

I.B.2.N.A. *QUERCUS ALBA* - (*QUERCUS NIGRA*) FOREST ALLIANCE (A.238) WHITE OAK - (WATER OAK) FOREST ALLIANCE

ALLIANCE CONCEPT

Summary: This alliance includes hardwood forests of the Coastal Plain dominated by *Quercus alba*. Stands assigned to this alliance are intermediate in moisture status, falling between the most mesic *Quercus alba* forests (accommodated by alliance A.228) in which *Fagus grandifolia* is usually codominant, and drier *Quercus alba* forests (accommodated by A.241) in which *Quercus falcata* or *Quercus stellata* is codominant. These forests are found in the Mid-Atlantic Coastal Plain of Virginia and North Carolina, westward to the Upper West and West Gulf Coastal Plain of Arkansas and Texas. In most of this range, these forests occur outside the natural distribution of both *Quercus rubra* and *Carya ovata*, although *Quercus rubra* may be present in limited parts of the East Gulf Coastal Plain, and *Carya ovata* may be present in the West Gulf Coastal Plain. While limited amounts of *Fagus grandifolia* may be present in the most mesic occurrences, examples in which *Fagus grandifolia* is a dominant species would be accommodated in another alliance as noted above. *Quercus nigra* is given as a nominal for its value as an indicator species, as the associations in this alliance occur within the range of this species and are likely to contain it, although not necessarily as a canopy codominant. Associated species include *Carya alba*, *Carya glabra*, *Carya ovalis*, *Carya pallida*, *Liquidambar styraciflua*, *Pinus taeda*, *Pinus echinata*, *Quercus velutina*, *Nyssa sylvatica*, *Quercus stellata*, and *Quercus falcata*. More mesic occurrences likely will have *Fagus grandifolia*, *Morus rubra*, *Quercus laurifolia*, *Quercus pagoda*, *Magnolia grandiflora*, *Magnolia macrophylla*, *Hamamelis virginiana*, *Asimina triloba*, *Callicarpa americana*, *Galium* spp., *Gelsemium sempervirens*, *Euonymus americana*, and *Sanicula* spp.; while drier examples will be more likely to have *Quercus stellata*, *Prunus serotina* var. *serotina*, *Chimaphila maculata*, *Vaccinium stamineum*, and *Vaccinium pallidum*. *Cornus florida*, *Acer rubrum*, and *Oxydendrum arboreum* are very common in the understory. The herbaceous stratum usually is sparse, and species that may occur include *Hexastylis arifolia*, *Elephantopus* spp., *Chimaphila maculata*, *Tephrosia virginiana*, *Coreopsis major*, and *Hieracium venosum*. Forests in this alliance can occur on a variety of sites including sandy swamp islands, Coastal Plain slopes, ridgetops, and other dry to dry-mesic fire-sheltered areas on acidic to circumneutral soils. This alliance occurs throughout the southeastern Coastal Plain and likely is distributed sparingly in the Piedmont. In this latter ecoregion (generally within the range of *Quercus rubra*) there could be some difficulty in assignment of associations to alliances (e.g. A.238 vs. A.239).

Related Concepts:

- Coastal Plain Loess Forest (Wieland 1994b) I
- IA8d. Southern Mixed Hardwood Forest (Allard 1990) I

- T1B4aII. *Quercus alba* - Mixed Hardwoods (Foti et al. 1994) ?
- White Oak - Water Oak / *Mitchella* - *Arisaema* Loamy Mesic Stream Bottoms (Turner et al. 1999) I
- White Oak: 53 (Eyre 1980) ?

Classification Comments: The most typical representatives of this alliance would be on naturally fire-sheltered sites.

ALLIANCE DISTRIBUTION

Range: This alliance occurs throughout the southeastern Coastal Plain and likely is distributed sparingly in the eastern Piedmont. It is found in Alabama, Arkansas, Georgia, Louisiana (?), Mississippi, North Carolina, South Carolina, Tennessee, Texas, and Virginia.

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

TNC Ecoregions: 40:C, 41:C, 42:C, 43:C, 52:P, 53:C, 56:C, 57:C, 58:P

USFS Ecoregions: 231Aa:C??, 231Af:C??, 231An:C??, 231Ba:CC?, 231Bc:CC?, 231Bd:CC?, 231Bi:CC?, 231Bj:CCC, 231Ea:CC?, 231Eb:CCC, 231Ec:CC?, 231Ed:CCC, 231Ef:CC?, 231Eg:CC?, 231Eh:CCC, 231Ei:CCC, 231Ej:CC?, 231Ek:CC?, 231El:CC?, 231Em:CC?, 231En:CC?, 232Ad:CCP, 232Ba:CCC, 232Bb:CCC, 232Bc:CCC, 232Bd:CCC, 232Bg:CCP, 232Bh:CCP, 232Bi:CCC, 232Bj:CCC, 232Bk:CCC, 232Bl:CCC, 232Bm:CCC, 232Bn:CCC, 232Bo:CCC, 232Bp:CCC, 232Bq:CCC, 232Br:CCC, 232Bs:CCC, 232Bv:CCC, 232Ca:CCC, 232Cb:CCC, 232Ce:CCC, 232Ch:CCP, 232Fa:CCC, 232Fe:CCC, 234Aa:CC?, 234Ab:CCC, 234Ac:CCP, 234Ae:CCC, 234Ag:CC?, 234Ah:CCC, 234Ak:CC?, 234An:CC?

Federal Lands: COE (Claiborne Lake); DOD (Fort Benning, Fort Gordon, Pine Bluff Arsenal); DOE (Savannah River Site); USFS (Angelina, Apalachicola, Bienville, Conecuh, Croatan, De Soto, Francis Marion, Holly Springs, Homochitto, Kisatchie, Osceola?, Sabine NF, Sam Houston, St. Francis, Sumter?, Talladega, Tombigbee, Tuskegee); USFWS (Felsenthal)

ALLIANCE SOURCES

References: Allard 1990, Eyre 1980, Foti et al. 1994, Monk et al. 1990, Schafale and Weakley 1990, Turner et al. 1999, Whipple et al. 1981, Wieland 1994b

I.B.2.N.d. Temporarily flooded cold-deciduous forest

I.B.2.N.D. *QUERCUS* (*PHELLOS*, *NIGRA*, *LAURIFOLIA*) TEMPORARILY FLOODED FOREST ALLIANCE (A.292)

(WILLOW OAK, WATER OAK, DIAMONDLEAF OAK) TEMPORARILY FLOODED FOREST ALLIANCE

ALLIANCE CONCEPT

Summary: Forests in this alliance are typically dominated by some combination of *Quercus phellos*, *Quercus nigra*, and/or *Quercus laurifolia*. They may be found throughout the Coastal Plain and adjacent areas of the lower Piedmont, Arkansas Valley, Interior Low Plateau, and the Ouachita Mountains in temporarily flooded environments. These forests may occur in large, relatively high-gradient floodplains (in which they tend to occur on topographically higher portions of the floodplain, such as ridges or terraces), or in small, relatively low-gradient floodplains (in which the landforms are too small and/or too poorly developed to create much consistent, local topographic relief). In the Atlantic and East Gulf Coastal Plains, these forests may occur more often in association with blackwater/low-sediment/low-nutrient rivers and streams than brownwater ones. Dominant and associated species vary with geographic location and landscape setting. Associated canopy species include *Quercus texana*, *Fraxinus pennsylvanica*, *Pinus taeda*, *Quercus similis*, *Quercus michauxii*, *Magnolia virginiana*, *Pinus glabra*, *Liquidambar styraciflua*, *Acer rubrum*, *Nyssa biflora*, *Ulmus alata*, *Carya aquatica*, *Carya alba*, *Carya glabra*, *Quercus pagoda*, *Taxodium distichum*, and *Celtis laevigata*. Subcanopy and shrub species include *Halesia diptera*, *Carpinus caroliniana*, *Ilex decidua*, *Sebastiania fruticosa*, *Ostrya virginiana*, *Viburnum rufidulum*, *Diospyros virginiana*, *Itea virginica*, *Symplocos tinctoria*, *Rhododendron canescens*, *Illicium floridanum*, *Cyrilla racemiflora*, *Ilex verticillata*, *Crataegus viridis*, *Vaccinium elliotii*, and *Ilex opaca* among others. Woody vines are an important component of these forests, and species include *Toxicodendron radicans*, *Bignonia capreolata*, *Smilax rotundifolia*, *Vitis rotundifolia*, *Parthenocissus quinquefolia*, *Trachelospermum difforme*, *Berchemia scandens*, *Smilax glauca*, *Campsis radicans*, *Cocculus carolinus*, *Ampelopsis arborea*, and others. This alliance also includes forests of large bottomlands dominated by *Quercus phellos* and *Ulmus crassifolia* that occur on flat ridges and grade up from forests dominated by *Quercus lyrata* and *Carya aquatica*. Characteristic canopy species include *Pinus taeda*, *Quercus similis*, *Liquidambar styraciflua*, *Gleditsia triacanthos*, and *Carya aquatica*, but the wettest sites likely will have only *Quercus phellos* and *Ulmus crassifolia*. Understory species include *Ilex decidua*, *Viburnum dentatum*, and *Crataegus* spp., with *Sabal minor* in drier sites. These forests occur on very acid to mildly alkaline soils, commonly on Portland, Tensas, and Hebert silt loams.

Related Concepts:

- *Quercus nigra* forest alliance (Hoagland 1998a) ?
- Cedar Elm - Hackberry / *Justicia* Wet-Mesic Stream Bottoms (Turner et al. 1999) I
- Coastal Plain Bottomland Hardwoods, Blackwater Subtype (Schafale and Weakley 1990) ?
- P1B3cVIII14c. *Quercus phellos* - *Quercus laurifolia* (Foti et al. 1994) ?
- P1B3cVIII14d. *Quercus phellos* - *Quercus nigra* (Foti et al. 1994) ?
- Sweetgum - Willow Oak: 92 (Eyre 1980) I
- Water Oak-Willow Oak Series (Diamond 1993) ?

- Willow Oak - Laurel Oak / *Bignonia* Loamy Wet-Mesic Stream Bottoms (Turner et al. 1999) ?
- Willow Oak - Water Oak - Diamondleaf (Laurel) Oak: 88 (Eyre 1980) I
- Willow Oak Forest (Foti 1994b) ?

Classification Comments: From Eyre (1980). Water oak - willow oak communities occur in northeastern Texas (Eidson pers. comm.). Some vegetation of the Interior Low Plateau of southern middle Tennessee is tentatively placed here.

ALLIANCE DISTRIBUTION

Range: Forests in this alliance occur in the Atlantic Coastal Plain, lower Piedmont, Arkansas Valley, East Gulf Coastal Plain, West Gulf Coastal Plain, and the Ouachita Mountains. This alliance is found in Arkansas, Florida, Georgia, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, and possibly Alabama (?) and Virginia (?).

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

TNC Ecoregions: 39:C, 40:C, 41:C, 42:C, 43:C, 44:C, 50:?, 52:C, 53:C, 55:P, 56:C, 57:C, 58:?

USFS Ecoregions: 222Eb:CCC, 222Ec:CC?, 222Eg:CC?, 231Aa:CCP, 231Ba:CCP, 231Bb:CCP, 231Bc:CCC, 231Bd:CCC, 231Be:CC?, 231Bf:CCP, 231Bi:CCP, 231Bj:CCP, 231Bl:CCP, 231Cc:C??, 231Cd:C??, 231Da:CC?, 231Db:CC?, 231Dc:CC?, 231Dd:CC?, 231De:CC?, 231Ea:CCP, 231Eb:CCP, 231Ec:CCP, 231Ed:CCP, 231Ee:CCP, 231Ef:CCP, 231Eg:CCC, 231Eh:CCC, 231Ei:CCC, 231Ej:CCP, 231Ek:CCP, 231El:CCC, 231Em:CCP, 231En:CCP, 231Ga:CCC, 231Gb:CCC, 232Ba:CCC, 232Bb:CCC, 232Bc:CCC, 232Bd:CCC, 232Be:CCC, 232Bf:CCC, 232Bg:CCC, 232Bh:CCC, 232Bi:CCC, 232Bj:CCC, 232Bk:CCC, 232Bl:CCC, 232Bm:CCC, 232Bn:CCC, 232Bo:CCC, 232Bp:CCC, 232Bq:CCC, 232Br:CCC, 232Bs:CCC, 232Bt:CCC, 232Bu:CCC, 232Bv:CCC, 232Bx:CCC, 232Bz:CCC, 232Ca:CCC, 232Cb:CCC, 232Cc:CCC, 232Cd:CCC, 232Ce:CCC, 232Cf:CCC, 232Cg:CCC, 232Ch:CCC, 232Ci:CCC, 232Cj:CCC, 232Ea:CCC, 232Fa:CCC, 232Fb:CCC, 232Fc:CCC, 232Fd:CCP, 232Fe:CCC, 234Aa:CCC, 234Ab:CCC, 234Ac:CCC, 234Ae:CCP, 234Ag:CCP, 234Ah:CC?, 234Ai:CCC, 234Ak:CC?, 234Al:CC?, 234Am:CCP, 234An:CCP, 255:?, M231Ac:CCC, M231Ad:CCC

Federal Lands: COE (Arkansas River); DOD (Arnold, Fort Benning, Pine Bluff Arsenal); DOE (Savannah River Site); NPS (Big Thicket?, Congaree Swamp, Gulf Islands); USFS (Angelina, Apalachicola, Bienville, Conecuh, Croatan?, Davy Crockett, De Soto, Delta, Francis Marion, Holly Springs, Homochitto, Kisatchie, Oconee?, Ouachita, Sabine NF, Sam Houston, St. Francis, Talladega, Tombigbee, Tuskegee); USFWS (Big Lake?, Eufaula, Hatchie, Lower Hatchie?, Pond Creek)

ALLIANCE SOURCES

References: Allen 1993a, Diamond 1993, Eidson pers. comm., Eyre 1980, Foti 1994b, Foti et al. 1994, Gemborys and Hodgkins 1971, Glascock and Ware 1979, Golden 1979, Hoagland 1998a, Martin and Smith 1991, Nixon and Raines 1976, Schafale and Weakley 1990, Smith 1994c, Turner et al. 1999

I.B.2.N.D. *SALIX NIGRA* TEMPORARILY FLOODED FOREST ALLIANCE (A.297) BLACK WILLOW TEMPORARILY FLOODED FOREST ALLIANCE

ALLIANCE CONCEPT

Summary: This alliance contains vegetation that is dominated by *Salix nigra* and that occurs in temporarily flooded sites, i.e., surface water is present for brief periods during the growing season, but the water table usually lies well below soil surface. Other canopy species that may be present include *Populus deltoides*, *Planera aquatica*, *Betula nigra*, *Platanus occidentalis*, *Celtis laevigata*, *Fraxinus pennsylvanica*, *Carya illinoensis*, *Diospyros virginiana*, *Quercus nigra*, *Cornus drummondii*, *Ulmus americana*, *Acer rubrum*, *Acer negundo*, *Acer saccharinum* (in the Mississippi River Alluvial Plain north of Memphis, Tennessee), *Catalpa bignonioides* (in range), and *Morus rubra*. The herbaceous and shrub strata may be absent to fairly dense, and species that may be present include *Ampelopsis arborea*, *Mikania scandens*, *Toxicodendron radicans*, *Polygonum* spp., *Erechtites hieracifolia*, *Boehmeria cylindrica*, *Commelina virginica*, *Eupatorium serotinum*, *Phytolacca americana*, *Asplenium platyneuron*, and others. This alliance is common on the fronts of both small rivers and streams and larger rivers where it is a component of point bar succession. This alliance is common throughout the southeastern and southern midwestern United States.

Related Concepts:

- Alluvial forest (Evans 1991) I
- Black Willow: 95 (Eyre 1980) I
- IIA7a. Black Willow Riverfront Forest (Allard 1990) I
- Montane Alluvial Forest (Schafale and Weakley 1990) ?
- R1B3cI3a. *Salix nigra* (Foti et al. 1994) ?
- Riparian forest (Evans 1991) I Riverfront Forest (Foti 1994b) I
- Rocky Bar and Shore (Schafale and Weakley 1990) ?
- Sand and Mud Bar (Schafale and Weakley 1990) ?

Classification Comments: None

ALLIANCE DISTRIBUTION

Range: This alliance is found in Iowa, Missouri, Virginia, West Virginia, Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, and Texas, and in Ontario, Canada. In addition, it is possibly found in Illinois (?), Indiana (?), Ohio (?), and Oklahoma (?).

Subnations: AL, AR, FL, GA, IA, IL?, IN?, KY, LA, MO?, MS, NC, OH?, OK?, ON, SC, TN, TX, VA, WV

TNC Ecoregions: 30:C, 31:C, 32:C, 33:C, 37:C, 38:P, 39:C, 40:P, 41:C, 42:C, 43:C, 44:C, 50:C, 51:P, 52:P, 53:C, 55:P, 56:P, 57:C, 58:P, 59:P

USFS Ecoregions: 221Db:CCP, 221Eb:CCP, 221Ec:CCP, 221Ed:CC?, 221Ef:CC?, 221Ha:CCC, 221Hb:CCC, 221Hc:CCC, 221Hd:CCP, 221He:CCC, 221Ja:CCP, 221Jb:CCC, 221Jc:CCP, 222Ab:CCP, 222Ag:CCP, 222Ah:CCP, 222Al:CCP, 222Am:CCP, 222An:CCP, 222Ca:CCP, 222Cb:CCP, 222Cc:CCP, 222Cd:CCP, 222Ce:CCP, 222Cf:CCP, 222Cg:CCP, 222Ch:CCP, 222Da:CCP, 222Db:CCP, 222Dc:CCP, 222Dd:CCP, 222De:CCP, 222Dg:CCP, 222Di:CCP, 222Dj:CCP, 222Ea:CCP, 222Eb:CCC, 222Ec:CCP, 222Ed:CCP, 222Ee:CCP, 222Ef:CCP, 222Eg:CCP, 222Eh:CCP, 222Ei:CCP, 222Ej:CCP, 222Ek:CCP, 222En:CCC, 222Eo:CCC, 222Fa:CCP, 222Fb:CCP, 222Fc:CCP, 222Fd:CCP, 222Ff:CCP, 231Aa:CCP, 231Ab:CCP, 231Ac:CCP, 231Ad:CCP, 231Ae:CCP, 231Af:CCP, 231Ag:CCP, 231Ah:CCP, 231Ai:CCP, 231Aj:CCP, 231Ak:CCP, 231Al:CCP, 231Am:CCP, 231An:CCP, 231Ao:CCP, 231Ap:CCP, 231Ba:CCP, 231Bb:CCP, 231Bc:CCC, 231Bd:CCP, 231Be:CCP, 231Bf:CCP, 231Bg:CCP, 231Bh:CCP, 231Bi:CCP, 231Bj:CCP, 231Bk:CCP, 231Bl:CCP, 231Ca:CCP, 231Cb:CCP, 231Cc:CCP, 231Cd:CCP, 231Ce:CCP, 231Cf:CCP, 231Cg:CCP, 231Da:CCP, 231Db:CCP, 231Dc:CCP, 231Dd:CCP, 231De:CCP, 231Ea:CCP, 231Eb:CCP, 231Ec:CCP, 231Ed:CCP, 231Ee:CCP, 231Ef:CCP, 231Eg:CCP, 231Eh:CCP, 231Ei:CCP, 231Ej:CCP, 231Ek:CCP, 231El:CCP, 231Em:CCP, 231En:CCP, 231Fa:CCP, 231Fb:CCP, 231Ga:CCC, 231Gb:CCC, 231Gc:CCP, 232Ba:CCP, 232Bb:CCP, 232Bc:CCP, 232Bd:CCP, 232Bg:CCP, 232Bh:CCP, 232Bi:CCP, 232Bj:CCP, 232Bk:CCP, 232Bl:CCP, 232Bm:CCC, 232Bn:CCP, 232Bo:CCP, 232Bp:CCP, 232Bq:CCC, 232Br:CCP, 232Bs:CCC, 232Bt:CCP, 232Bu:CCP, 232Bv:CCP, 232Bx:CCP, 232Bz:CCP, 232Ca:CCP, 232Cb:CCP, 232Cc:CCP, 232Cd:CCP, 232Cf:CCP, 232Cg:CCP, 232Ch:CCP, 232Cj:CCP, 232Dc:CCP, 232Ee:CCP, 232Fa:CCP, 232Fb:CCP, 232Fc:CCP, 232Fd:CCP, 232Fe:CCP, 234Aa:CC?, 234Ac:CCC, 234Ad:CCP, 234Af:CC?, 234Ag:CCC, 234Ah:CC?, 234Ai:CC?, 234Aj:CCP, 234Ak:CC?, 234Al:CC?, 234Am:CCC, 234An:CCC, 251Ea:CCP, 251Ec:CCP, 251Ed:CCP, 251Fb:CCP, 251Fc:CCP, 255Aa:CCP, 255Ab:CCP, 255Ac:CCP, 255Ad:CCP, 255Ae:CCP, 255Af:CCP, 255Ag:CCP, 255Ah:CCP, 255Ai:CCP, 255Aj:CCP, 255Ak:CCP, 255Ba:CCP, 255Ca:CCP, 255Cb:CCP, 255Cc:CCP, 255Cd:CCP, 255Ce:CCP, 255D:CC, 311A:CC, 315E:CC, 332E:CC, M221Aa:CCP, M221Ab:CCP, M221Ba:CCP, M221Bd:CCP, M221Be:CCP, M221Ca:CCP, M221Cb:CCP, M221Cc:CCP, M221Cd:CCC, M221Ce:CCP, M221Da:CCP, M221Db:CCP, M221Dc:CCP, M221Dd:CCP, M222Aa:CCP, M222Ab:CCP, M231Aa:CCP, M231Ab:CCP, M231Ac:CCP, M231Ad:CCP

Federal Lands: COE (Arkansas River); DOD (Arnold, Fort Benning); DOE (Savannah River Site); NPS (Congaree Swamp, Ninety Six, Stones River); TVA (Tellico); USFS (Angelina, Apalachicola, Bienville, Cherokee?, Conecuh, Daniel Boone, Davy Crockett, De Soto, Delta, Francis Marion, Holly Springs, Kisatchie, Nantahala, Ocala?, Pisgah, Sabine NF, Sam Houston, St. Francis, Sumter?, Talladega, Tombigbee, Tuskegee); USFWS (Chickasaw NWR, Lower Rio Grande Valley, Reelfoot?, Santa Ana)

ALLIANCE SOURCES

References: Allard 1990, Burns and Honkala 1990b, Evans 1991, Eyre 1980, Faber-Langendoen et al. 1996, Foti 1994b, Foti et al. 1994, Klimas 1988b, Schafale and Weakley 1990, Van Auken and Bush 1988, Wharton et al. 1982

I.B.2.N.e. Seasonally flooded cold-deciduous forest

I.B.2.N.E. *QUERCUS (LAURIFOLIA, PHELLOS) SEASONALLY FLOODED FOREST ALLIANCE (A.327)*

(DIAMONDLEAF OAK, WILLOW OAK) SEASONALLY FLOODED FOREST ALLIANCE

ALLIANCE CONCEPT

Summary: This alliance occurs in seasonally flooded portions of active floodplains that periodically receive overbank flooding and hold water into the growing season. The canopy usually contains *Quercus laurifolia* or *Quercus phellos*. Other species characteristic of forests in this alliance include *Taxodium distichum*, *Nyssa biflora*, *Quercus nigra*, *Fraxinus caroliniana*, *Itea virginica*, *Sabal minor*, *Justicia ovata*, *Proserpinaca pectinata*, and *Saururus cernuus*. The subcanopy layer is often well-developed and *Carpinus caroliniana* is common, but the shrub and herbaceous layers usually are sparse. These forests often grade into *Taxodium - Nyssa* swamps. They are distributed in the Atlantic Coastal Plain from North Carolina and possibly Virginia to Georgia, and in the Gulf Coast to Louisiana and possibly Texas. An association described from Ft. Benning and the Oconee National Forest is dominated by *Quercus phellos* and *Liquidambar styraciflua*.

Related Concepts: No information

Classification Comments: This alliance is known from TNC's Altamaha River Bioreserve. Some associations in A.292 with *Quercus laurifolia* dominance appear to deserve relocation to this alliance (A.327). These include longer-hydroperiod, seasonally flooded floodplains and seasonally flooded upland depressions and flatwoods. If this occurs, it will necessitate revising the alliance description and distribution for A.327.

ALLIANCE DISTRIBUTION

Range: Forests in this alliance are distributed in the Atlantic Coastal Plain from North Carolina and possibly Virginia to Georgia and Florida, and in the Gulf Coast to Louisiana and Texas.

Subnations: AL, FL, GA, LA?, MS?, NC, SC, TX, VA?

TNC Ecoregions: 40:P, 41:C, 43:C, 52:C, 53:C, 55:C, 56:C, 57:C, 58:P

USFS Ecoregions: 231Ah:CC?, 231Ai:CC?, 231Ba:CC?, 231Bc:CC?, 231Bd:CCC, 231Bf:CC?, 231E:CP, 232Ba:CCP, 232Bb:CCP, 232Bc:CCP, 232Bd:CCP, 232Be:CCP, 232Bf:CCC, 232Bg:CCP, 232Bh:CCC, 232Bi:CCP, 232Bj:CCP, 232Bk:CCP, 232Bl:CCP, 232Bm:CCP, 232Bn:CCP, 232Bo:CCP, 232Bp:CCP, 232Bq:CCC, 232Br:CCC, 232Bs:CCC, 232Bt:CCP, 232Bu:CCP, 232Bv:CCP, 232Bx:CCP, 232Bz:CCP, 232Ca:CCC, 232Cb:CCC, 232Cg:CCC, 232Dc:CCC, 232Fa:CCP, 232Fb:CCP, 232Fc:CCP, 232Fd:CCC

Federal Lands: DOD (Fort Benning, Fort Gordon?); DOE (Savannah River Site); NPS (Congaree Swamp); USFS (Angelina, Croatan, Davy Crockett?, Francis Marion, Kisatchie?, Ocala, Oconee, Sabine NF?)

ALLIANCE SOURCES

References: Jones et al. 1981b, Schafale and Weakley 1990, Wharton et al. 1982, Whisenant 1981

I.B.2.N.E. NYSSA (*AQUATICA*, *BIFLORA*, *OGECHE*) FLOODPLAIN SEASONALLY FLOODED FOREST ALLIANCE (A.323) (WATER TUPELO, SWAMP BLACKGUM, OGEECHEE TUPELO) FLOODPLAIN SEASONALLY FLOODED FOREST ALLIANCE

ALLIANCE CONCEPT

Summary: This alliance includes forests dominated by some combination of *Nyssa aquatica*, *Nyssa biflora*, or *Nyssa ogeche* without substantial *Taxodium distichum*, that occur in seasonally flooded floodplains, sloughs, and backswamps. *Acer rubrum* var. *rubrum*, *Quercus laurifolia*, *Quercus lyrata*, *Ulmus americana*, and *Liquidambar styraciflua* are characteristic canopy species. The canopy layer in these forests often is dense, but strata below are sparse to very sparse. *Fraxinus caroliniana*, *Itea virginica*, and *Sebastiania fruticosa* are common understory species. Common herbaceous species of forests in this alliance include *Carex gigantea*, *Phanopyrum gymnocarpon* (= *Panicum gymnocarpon*), *Pluchea* sp., *Carex bromoides*, *Rhynchospora corniculata*, *Leersia lenticularis*, *Proserpinaca pectinata*, and *Pleopeltis polypodioides*.

Related Concepts:

- Basin Swamp (FNAI 1992a) I
- Basin Swamp, Blackgum Swamp subtype (FNAI 1992b) ?
- Coastal Plain Bottomland Hardwoods, Blackwater Subtype (Schafale and Weakley 1990) I
- IIA4d. Tupelo Swamp (Allard 1990) I
- Water Tupelo - Swamp Tupelo: 103 (Eyre 1980) I

Classification Comments: This alliance includes both blackwater and brownwater small stream swamp forests dominated by *Nyssa ogeche* within its range of the Coastal Plain of Georgia, northern Florida, and southeastern South Carolina. This alliance is attributed to Congaree Swamp (NPS), but not to any association; alliance was not noted in TNC 1998b.

ALLIANCE DISTRIBUTION

Range: Distribution of this alliance is the Atlantic Coastal Plain from southern Virginia to Florida, and the Gulf Coastal Plain to eastern Texas. This alliance is found in Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, North Carolina, South Carolina, and Virginia, and possibly Texas (?).

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

TNC Ecoregions: 31:C, 38:P, 40:P, 41:C, 42:C, 43:P, 44:P, 53:C, 55:P, 56:C, 57:C, 58:P

USFS Ecoregions: 222Cb:CCP, 222Cc:CCP, 222Ce:CCP, 222Cf:CCP, 222Cg:CCP, 222Ch:CCP, 222Eb:CCC, 222Ef:CC?, 231Aa:CC?, 231Ae:CC?, 231Af:CCC, 231Ba:CCP, 231Bb:CCP, 231Bc:CCP, 231Bd:CCP, 231Bf:CC?, 231Bg:CCP, 231Bh:CCP, 231Bi:CCP, 231Bj:CCP, 231Bl:CCP, 231Fa:CCC, 232Ba:CCP, 232Bb:CCP, 232Bc:CCP, 232Bd:CCP, 232Be:CCP, 232Bf:CCP, 232Bg:CCC, 232Bh:CCP, 232Bi:CCP, 232Bj:CCP, 232Bk:CCP, 232Bl:CCP, 232Bm:CCP, 232Bn:CCP, 232Bo:CCP, 232Bp:CCP, 232Bq:CCC, 232Br:CCC, 232Bs:CCC, 232Bt:CCP, 232Bu:CCP, 232Bv:CCC, 232Bx:CCP, 232Bz:CCP, 232Ca:CCC, 232Cb:CCC, 232Cc:CCP, 232Cd:CCP, 232Ce:CCC, 232Cf:CCC, 232Cg:CCP, 232Ch:CCC, 232Ci:CCC, 232Cj:CCP, 232Dc:CCC, 232Fa:CCP, 232Fb:CCP, 232Fc:CCP, 232Fd:CCP, 232Fe:CCP, 234Aa:CCP, 234Ac:CCC, 234Ad:CCC, 234Ae:CCC, 234Af:CCP, 234Ag:CCP, 234Ah:CCC, 234Ai:CCC, 234Aj:CCC, 234Ak:CCC, 234Al:CC?, 234Am:CCC, 234An:CCC

Federal Lands: DOD (Fort Benning, Fort Gordon, Fort Stewart); DOE (Savannah River Site); NPS (Congaree Swamp); USFS (Apalachicola, Francis Marion, Kisatchie, Uwharrie)

ALLIANCE SOURCES

References: Allard 1990, Eyre 1980, FNAI 1992a, FNAI 1992b, Schafale and Weakley 1990, Wharton 1978, Whipple et al. 1981

**I.B.2.N.E. NYSSA (AQUATICA, BIFLORA, OGECHE) POND SEASONALLY FLOODED FOREST ALLIANCE (A.324)
(WATER TUPELO, SWAMP BLACKGUM, OGEECHEE TUPELO) POND SEASONALLY FLOODED FOREST ALLIANCE**

ALLIANCE CONCEPT

Summary: Forests, dominated by one or more of *Nyssa aquatica*, *Nyssa biflora*, or *Nyssa ogeche*, that occur in isolated wetlands within an upland matrix. Other woody species that may be present include *Taxodium ascendens*, *Cephalanthus occidentalis*, *Liquidambar styraciflua*, *Itea virginica*, *Acer rubrum* var. *rubrum*, *Quercus nigra*, *Leucothoe racemosa*, *Viburnum nudum* var. *nudum*, *Alnus serrulata*, *Ilex verticillata*, *Clethra alnifolia*, *Lyonia lucida*, and *Cliftonia monophylla* (within its range). The shrub and herb layers may be sparse to relatively lush and characteristic herbaceous species include *Carex jooorii*, *Saccharum baldwinii*, *Smilax laurifolia*, *Juncus repens*, *Carex crinita*, *Panicum virgatum* var. *virgatum*, *Woodwardia virginica*, *Carex turgescens*, *Carex striata*, *Carex glaucescens*, *Carex verrucosa*, *Woodwardia areolata*, *Osmunda cinnamomea*, and *Rhynchospora* spp. Vegetation of peaty or mucky, acidic, wet depressions in the Atlantic and East Gulf coastal plains, as well as of isolated ponds in the Interior Low Plateau is included in this alliance. There is a rare community in this alliance dominated by *Nyssa ogeche* that occurs in sinkhole depressions in Georgia and Florida.

Related Concepts:

- Basin Swamp (FNAI 1992a) I
- Bottomland Forest (FNAI 1992a) I
- IIA10b. Swamp Tupelo Pond Forest (Allard 1990) I
- Upland Pool (Schafale and Weakley 1990) I
- Water Tupelo - Swamp Tupelo: 103 (Eyre 1980) I

Classification Comments: None

ALLIANCE DISTRIBUTION

Range: Forests in this alliance are found in the Atlantic and East Gulf coastal plains, as well as in the Interior Low Plateau. There is a rare community in this alliance dominated by *Nyssa ogeche* that occurs in sinkhole depressions in Georgia and Florida. This alliance is found in Alabama, Florida, Georgia, Louisiana, Mississippi, Missouri, North Carolina, South Carolina, Tennessee, and Virginia, and possibly Arkansas (?).

Subnations: AL, AR?, FL, GA, LA, MO, MS, NC, SC, TN, VA?

TNC Ecoregions: 38:P, 43:P, 44:C, 50:C, 52:C, 53:C, 55:C, 56:C, 57:C, 58:P

USFS Ecoregions: 222A:CC, 222Cb:CCP, 222Cc:CCP, 222Ce:CCP, 222Cf:CCP, 222Cg:CCP, 222Ch:CCP, 222Eb:CCC, 222Ef:CC?, 231Aa:CC?, 231Ae:CC?, 231Af:CCC, 231Ba:CCP, 231Bb:CCP, 231Bc:CCP, 231Bd:CCP, 231Bf:CC?, 231Bg:CCP, 231Bh:CCP, 231Bi:CCP, 231Bj:CCP, 231Bl:CCP, 232Ba:CCP, 232Bb:CCP, 232Bc:CCP, 232Bd:CCP, 232Be:CCP, 232Bf:CCP, 232Bg:CCC, 232Bh:CCC, 232Bi:CCP, 232Bj:CCP, 232Bk:CCP, 232Bl:CCP, 232Bm:CCP, 232Bn:CCP, 232Bo:CCP, 232Bp:CCP, 232Bq:CCP, 232Br:CCC, 232Bs:CCC, 232Bt:CCP, 232Bu:CCP, 232Bv:CCC, 232Bx:CCP, 232Bz:CCP, 232Ca:CCC, 232Cb:CCC, 232Cc:CCP, 232Cd:CCP, 232Ce:CCP, 232Cf:CCP, 232Cg:CCP, 232Ch:CCC, 232Ci:CCC, 232Cj:CCP, 232Dc:CCC, 232Fc:CCP, 232Fd:CCP, 234Aa:CC?, 234Ad:CC?, 234Af:CC?, 234Ah:CC?, 234Ai:CC?, 234Aj:CC?, 234Ak:CC?, 234Al:CC?, 234An:CCC

Federal Lands: DOD (Arnold, Eglin, Fort Benning, Fort Stewart); USFS (Apalachicola, Conecuh, Croatan, De Soto, Francis Marion, Holly Springs?, Kisatchie?, Oconee?, Osceola, St. Francis, Tombigbee?, Tuskegee, Uwharrie); USFWS (Eufaula)

ALLIANCE SOURCES

References: Allard 1990, Clewell 1971, Clewell 1981, Eyre 1980, FNAI 1992a, Schafale and Weakley 1990, Smith pers. comm.

**I.B.2.N.E. TAXODIUM DISTICHUM - NYSSA (AQUATICA, BIFLORA, OGECHE) SEASONALLY FLOODED FOREST ALLIANCE (A.337)
BALD-CYPRESS - (WATER TUPELO, SWAMP BLACKGUM, OGEECHEE TUPELO) SEASONALLY FLOODED FOREST ALLIANCE**

ALLIANCE CONCEPT

Summary: Floodplain forests, with seasonally flooded hydrology, dominated by *Taxodium distichum* and usually one or more of the following: *Nyssa aquatica*, *Nyssa biflora*, and/or *Nyssa ogeche*. Characteristic woody species include *Quercus lyrata*, *Carya aquatica*, *Acer rubrum*, *Planera aquatica*, *Fraxinus caroliniana*, *Liquidambar styraciflua*, *Quercus laurifolia*, *Populus heterophylla*, *Ilex decidua*, and others. The subcanopy, shrub and herbaceous layers of these communities range from sparse to moderate. Herbaceous and vine species that may be present include *Leersia lenticularis*, *Justicia ovata*, *Carex intumescens*, *Boehmeria cylindrica*, *Onoclea sensibilis*, *Commelina communis*, *Hydrocotyle verticillata*, *Ludwigia palustris*, *Carex bromoides*, *Saururus cernuus*, *Pilea pumila*, *Phanopyrum gymnocarpon* (= *Panicum gymnocarpon*), *Campsis radicans*, *Smilax tamnoides* (= *Smilax hispida*), *Ampelopsis arborea*, *Mikania scandens*, and others. Forests in this alliance occur in the Coastal Plain from Virginia south to Florida, west to eastern Texas, and in the Mississippi River alluvial basin north to southern Illinois.

Related Concepts:

- Bald Cypress - Water Tupelo Swamp (Wieland 1994b) ?
- Baldcypress - Tupelo: 102 (Eyre 1980) I
- Baldcypress / *Ceratophyllum* Semi-Permanently Flooded Swamps (Turner et al. 1999) I
- Baldcypress-Water Tupelo Series (Diamond 1993) I Cypress - Tupelo Swamp (Foti 1994b) ?
- Cypress swamp (Evans 1991) I
- Cypress/Cypress-Tupelo Swamp (Smith 1996a) I
- Floodplain swamp (FNAI 1992a) I
- IIA4b. Bald Cypress - Water Tupelo Swamp (Allard 1990) I
- P1B3dI1b. *Taxodium distichum* - *Nyssa aquatica* (Foti et al. 1994) ?
- Palustrine *Taxodium distichum*-*Nyssa* spp. Series (Pyne 1994) I

Classification Comments: Compare to alliances in I.B.2.N.f with semipermanently flooded hydrology where surface water persists through the growing season in most years. This alliance with seasonal flooding has flooding of long duration, but the water level is below the surface by the end of the growing season. Several communities in Louisiana contain *Taxodium distichum* with various hardwoods (*Quercus nigra* and *Magnolia virginiana*; *Celtis laevigata* and *Acer rubrum* or *Acer negundo*). Assessment is needed regarding their alliance placement.

ALLIANCE DISTRIBUTION

Range: Forests in this alliance occur in the Coastal Plain from Delaware south to Florida and west to eastern Texas and in the Mississippi River alluvial basin north to Kentucky.

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

TNC Ecoregions: 40:P, 41:C, 42:C, 43:C, 53:C, 55:C, 56:C, 57:C, 58:C

USFS Ecoregions: 231B:C?, 231E:CP, 231Gc:CCC, 232Ac:CCC, 232Ad:CCC, 232Ba:CCC, 232Bb:CCC, 232Bc:CCC, 232Bd:CCC, 232Be:CCC, 232Bf:CCC, 232Bg:CCC, 232Bh:CCC, 232Bi:CCC, 232Bj:CCC, 232Bk:CCC, 232Bl:CCC, 232Bm:CCC, 232Bn:CCC, 232Bo:CCC, 232Bp:CCC, 232Bq:CCC, 232Br:CCC, 232Bs:CCC, 232Bt:CCC, 232Bu:CCC, 232Bv:CCC, 232Bx:CCC, 232Bz:CCC, 232Ca:CCC, 232Cb:CCC, 232Cc:CCC, 232Cd:CCC, 232Cf:CCC, 232Cg:CCC, 232Ch:CCC, 232Ci:CCC, 232Cj:CCC, 232Dc:CCC, 232Fa:CCC, 232Fb:CCC, 232Fc:CCC, 232Fd:CCC, 232Fe:CCC, 234Aa:CCC, 234Ac:CCC, 234Ad:CCC, 234Ae:CCC, 234Af:CCC, 234Ag:CCC, 234Ah:CCC, 234Ai:CCC, 234Aj:CCC, 234Ak:CCC, 234Al:CCC, 234Am:CCC, 234An:CCC

Federal Lands: DOD (Camp Lejeune, Camp MacKall); DOE (Savannah River Site); NPS (Congaree Swamp); USFS (Angelina, Apalachicola, Croatan, Davy Crockett, De Soto, Delta, Francis Marion, Holly Springs, Kisatchie, Ocala, Osceola, Sabine NF, Sam Houston, Tuskegee); USFWS (Okefenokee?)

ALLIANCE SOURCES

References: Allard 1990, Conner and Day 1976, Conner et al. 1981, Diamond 1993, Evans 1991, Eyre 1980, FNAI 1992a, Foti 1994b, Foti et al. 1994, Jones et al. 1981b, Martin and Smith 1991, Pyne 1994, Schafale and Weakley 1990, Schneider et al. 1989, Smith 1996a, Turner et al. 1999, Wharton 1978, Wharton et al. 1982, Whipple et al. 1981, Wieland 1994b

I.B.2.N.E. SALIX NIGRA SEASONALLY FLOODED FOREST ALLIANCE (A.334)

BLACK WILLOW SEASONALLY FLOODED FOREST ALLIANCE

ALLIANCE CONCEPT

Summary: This alliance contains *Salix nigra* communities with seasonally flooded hydrology, i.e., the water table is below the soil surface by the end of the growing season in most years. They can occur in the swamps away from the river, behind the levees in the Mississippi River floodplain with *Carya aquatica* (K. Ribbeck pers. comm.), as well as on newly accreted areas on large river floodplains and along lakeshores, irrigation reservoirs, and borrow areas. These forests also may develop following clearcut logging in swamp forests. Species composition varies with geography and topographic setting. Other species that may be present include *Quercus lyrata*, *Taxodium distichum*, *Nyssa aquatica*, *Nyssa biflora*, *Morella cerifera* (= *Myrica cerifera*), *Gleditsia triacanthos*, *Fraxinus pennsylvanica*, *Acer rubrum*, and *Celtis laevigata*. *Cephalanthus occidentalis* is a common shrub in these forests. The vine component often is well-developed. These communities are often short-lived and succeed to bottomland hardwood forests. However, reportedly in Mississippi, long-persisting forests of this type have huge trees on loamy soils of low terraces with little understory (R. Wieland pers. comm.). In the Columbia Bottomlands area of coastal Texas, vegetation classified in this alliance occupies large shallow ponds in ancient river floodplains. The successional status of this vegetation is undetermined, but it is apparently long persisting.

Related Concepts:

- Black Willow: 95 (Eyre 1980) I
- IIA7a. Black Willow Riverfront Forest (Allard 1990) I
- Riparian forest (Evans 1991) ?

Classification Comments: None

ALLIANCE DISTRIBUTION

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

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

TNC Ecoregions: 31:C, 32:P, 33:C, 37:P, 38:C, 39:C, 40:P, 41:C, 42:C, 43:C, 44:C, 50:C, 52:C, 53:C, 56:C, 57:C, 58:P

USFS Ecoregions: 221Db:CCP, 221Eb:CCP, 221Ha:CCP, 221Hb:CCP, 221Hc:CCP, 221Hd:CCP, 221He:CCP, 221Ja:CCP, 221Jb:CCC, 221Jc:CCP, 222Ab:CCP, 222Ag:CCP, 222Ah:CCP, 222Al:CCP, 222Am:CCP, 222An:CCP, 222Ca:CCP, 222Cb:CCP, 222Cc:CCP, 222Cd:CCP, 222Ce:CCP, 222Cf:CCP, 222Cg:CCP, 222Ch:CCP, 222Da:CCP, 222Db:CCP, 222Dc:CCP, 222Dd:CCP, 222De:CCP, 222Dg:CCP, 222Di:CCP, 222Dj:CCP, 222Ea:CCP, 222Eb:CCC, 222Ec:CCP, 222Ed:CCP, 222Ee:CCP, 222Ef:CCP, 222Eg:CCP, 222Eh:CCP, 222Ei:CCP, 222Ej:CCP, 222Ek:CCP, 222En:CCC, 222Eo:CCC, 222Fa:CCP, 222Fb:CCP, 222Fc:CCP, 222Fd:CCP, 222Ff:CCP, 231Aa:CCP, 231Ab:CCP, 231Ac:CCP, 231Ad:CCP, 231Ae:CCP, 231Af:CCP, 231Ag:CCP, 231Ah:CCP, 231Ai:CCP, 231Aj:CCP, 231Ak:CCP, 231Al:CCP, 231Am:CCP, 231An:CCP, 231Ao:CCP, 231Ap:CCP, 231Ba:CCP, 231Bb:CCP, 231Bc:CCP, 231Bd:CCP, 231Be:CCP, 231Bf:CCP, 231Bg:CCP, 231Bh:CCP, 231Bi:CCP, 231Bj:CCP, 231Bk:CCP, 231Bl:CCP, 231Ca:CCP, 231Cb:CCP, 231Cc:CCP, 231Cd:CCP, 231Ce:CCP, 231Cf:CCP, 231Cg:CCP, 231Da:CCP, 231Db:CCP, 231Dc:CCP, 231Dd:CCP, 231De:CCP, 231Ea:CCP, 231Eb:CCP, 231Ec:CCP, 231Ed:CCP, 231Ee:CCP, 231Ef:CCP, 231Eg:CCP, 231Eh:CCP, 231Ei:CCP, 231Ej:CCP, 231Ek:CCP, 231El:CCP, 231Em:CCP, 231En:CCP, 231Fa:CCP, 231Fb:CCP, 231Ga:CCP, 231Gb:CCP, 231Gc:CCP, 232Ba:CCP, 232Bb:CCP, 232Bc:CCP, 232Bd:CCC, 232Bg:CCP, 232Bh:CCP, 232Bi:CCP, 232Bj:CCC, 232Bk:CCP, 232Bl:CCP, 232Bm:CCP, 232Bn:CCP, 232Bo:CCP, 232Bp:CCP, 232Bq:CCC, 232Br:CCP, 232Bs:CCC, 232Bt:CCP, 232Bu:CCP, 232Bv:CCP, 232Bx:CCP, 232Bz:CCP, 232Ca:CCP, 232Cb:CCP, 232Cc:CCP, 232Cd:CCP, 232Cf:CCP, 232Cg:CCP, 232Ch:CCP, 232Cj:CCP, 232Dc:CCP, 232Eb:CCC, 232Ee:CCP, 232Fa:CCP, 232Fb:CCP, 232Fc:CCP, 232Fd:CCP, 232Fe:CCP, 234Aa:CCC, 234Ab:CCC, 234Ac:CCC, 234Ad:CCC, 234Ae:CCC, 234Af:CCC, 234Ag:CCC, 234Ah:CCC, 234Ai:CCC, 234Aj:CCC, 234Ak:CCC, 234Al:CCC, 234Am:CCC, 234An:CCC, 251Ea:CCP, 251Ec:CCP, 251Ed:CCP, 251Fb:CCP, 251Fc:CCP, 255Aa:CCP, 255Ab:CCP, 255Ac:CCP, 255Ad:CCP, 255Ae:CCP, 255Af:CCP, 255Ag:CCP, 255Ah:CCP, 255Ai:CCP, 255Aj:CCP, 255Ak:CCP, 255Ba:CCP, 255Ca:CCP, 255Cb:CCP, 255Cc:CCP, 255Cd:CCP, 255Ce:CCP, 255Db:CCC, 311A:CC, 332E:CC, M221Aa:CCP, M221Ab:CCP, M221Ba:CCP, M221Bd:CCP, M221Be:CCP, M221Ca:CCP, M221Cb:CCP, M221Cc:CCP, M221Cd:CCP, M221Ce:CCP, M221Da:CCP, M221Db:CCP, M221Dc:CCP, M221Dd:CCP, M222Aa:CCP, M222Ab:CCP, M231Aa:CCP, M231Ab:CCP, M231Ac:CCP, M231Ad:CCP

Federal Lands: DOD (Arnold); USFS (Angelina, Apalachicola, Bienville, Conecuh, Daniel Boone, Davy Crockett, De Soto, Delta, Francis Marion, Holly Springs, Kisatchie, Ocala, Sabine NF, Sam Houston, St. Francis, Tombigbee?, Tuskegee); USFWS (Aransas, San Bernard)

ALLIANCE SOURCES

References: Allard 1990, Allen 1958, Evans 1991, Eyre 1980, Klimas 1988b, Ribbeck pers. comm., TNC 1998a, Wieland pers. comm.

I.B.2.N.E. *QUERCUS LYRATA* - (*CARYA AQUATICA*) SEASONALLY FLOODED FOREST ALLIANCE (A.328)

OVERCUP OAK - (WATER HICKORY) SEASONALLY FLOODED FOREST ALLIANCE

ALLIANCE CONCEPT

Summary: *Quercus lyrata* is dominant or codominant in stands of this alliance. There is often substantial *Carya aquatica*, especially in the wetter sites where no other canopy species occur. Less wet occurrences of this alliance will have substantial *Liquidambar styraciflua*, as well as *Quercus texana* within its range. Species composition varies with geography, but characteristic species include *Quercus laurifolia*, *Fraxinus pennsylvanica*, *Carpinus caroliniana*, *Fraxinus profunda*, *Taxodium distichum*, *Planera aquatica*, *Populus heterophylla*, *Celtis laevigata*, *Diospyros virginiana*, *Acer rubrum*, *Quercus phellos* (sometimes codominant to dominant), and occasionally *Ulmus americana*, *Nyssa sylvatica*, *Quercus michauxii*, and *Quercus palustris*. Common understory and shrub associates include *Ilex decidua*, *Crataegus viridis*, *Cornus foemina* (= *Cornus stricta*), *Forestiera acuminata*, *Carpinus caroliniana*, and *Cephalanthus occidentalis*. Species composition and density of the herbaceous stratum vary with geography and frequency of flooding. Common species in this layer include *Justicia ovata*, *Saururus cernuus*, *Leersia lenticularis*, *Mikania scandens*, *Lobelia cardinalis*, *Ludwigia palustris*, *Diodia virginiana*, *Gratiola virginiana*, *Carex jorii*, *Carex intumescens*, *Symphytotrichum lateriflorum* (= *Aster lateriflorus*), *Boehmeria cylindrica*, and *Pilea pumila*. The exotic *Ludwigia grandiflora* (= *Ludwigia uruguayensis*) may be common in examples of this alliance. Some occurrences in Arkansas have *Gleditsia aquatica*, *Liquidambar styraciflua*, *Acer rubrum*, *Acer saccharinum*, and *Diospyros virginiana*. Shrubs include *Planera aquatica*, *Styrax americanus*, *Cornus foemina*, and *Cephalanthus occidentalis*. Vines are common and species include *Lonicera japonica* (exotic), *Vitis palmata*, and *Cardiospermum halicacabum*. Forests of this alliance occur on heavy clay soils of the Orders Ultisol and Vertisol on low, wet, seasonally flooded floodplains, shallow sloughs with relatively little water flow, and in depressions.

Related Concepts:

- Bottomland hardwood swamp (Evans 1991) I
- Depression swamp (Evans 1991) I

- Floodplain Forest (FNAI 1992a) ?
- Floodplain Forest, Overcup Oak/Water Hickory Flat subtype (FNAI 1992b) ?
- IIA5a. Overcup Oak - Water Hickory Bottomland Forest (Allard 1990) ? Overcup Oak - Water Hickory: 96 (Eyre 1980) I
- Overcup Oak / *Justicia* Clayey/Loamy Seasonally Flooded Low River Floodplains (Turner et al. 1999) ?
- Overcup Oak Forest (Foti 1994b) ?
- Overcup Oak Series (Diamond 1993) I
- P1B3cI. *Quercus lyrata* (Foti et al. 1994) I
- P1B3cI4a. *Quercus lyrata* - *Quercus nuttallii* (= *Q. texana*) - *Liquidambar styraciflua* (Foti et al. 1994) ?
- P1B3cVIII14b. *Quercus phellos* - *Quercus palustris* - *Quercus lyrata* (Foti et al. 1994) ?

Classification Comments: *Carya aquatica* was put back in the name for places in Arkansas and Louisiana with little or no *Quercus lyrata*. This alliance may need to be split; there are four associations which represent ponds (e.g., *Quercus lyrata* - *Quercus palustris* / *phellos*) - *Liquidambar styraciflua* - (*Populus heterophylla*) Forest (CEGL004421) [KY, TN], *Quercus lyrata* - *Quercus palustris* / *Acer rubrum* var. *drummondii* / *Itea virginica* - *Cornus foemina* - (*Lindera melissifolia*) Forest (CEGL004778) [AR, MO], *Quercus lyrata* / *Betula nigra* / *Pleopeltis polypodioides* ssp. *michauxiana* Forest (CEGL004975) [TN], and *Quercus lyrata* Pond Forest (CEGL004642) [AR, MO].

ALLIANCE DISTRIBUTION

Range: This alliance occurs throughout the Atlantic Coastal Plain from Virginia to Florida, and in the Gulf Coastal Plain to Texas. It also is found in the Mississippi River Alluvial Plain northward to Illinois. It is found in Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, western Tennessee, eastern Texas, Virginia, southeastern Missouri, southern Illinois, and southwestern Indiana.

Subnations: AL, AR, FL, GA, IL, IN, KY, LA, MO, MS, NC, OK, SC, TN, TX

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

USFS Ecoregions: 222Cc:CC?, 222Cd:CC?, 222Ce:CC?, 222Cf:CC?, 222Cg:CCC, 222D:C?, 222Eb:CCC, 222Ef:CCC, 222Eg:CCP, 222Eh:CCC, 231Aa:CCP, 231Ae:CCC, 231Af:CCP, 231Ai:CCP, 231Aj:CCP, 231Ao:CCP, 231Ba:CP?, 231Bb:CP?, 231Bc:CP?, 231Bd:CP?, 231Be:CP?, 231Bf:CCP, 231Bg:CP?, 231Bh:CCP, 231Bi:CP?, 231Bj:CP?, 231Bk:CP?, 231Bl:CP?, 231C:CP, 231Da:CC?, 231Dc:CCC, 231Ea:CCC, 231Ec:CCC, 231Ed:CCC, 231Ef:CCC, 231Eg:CCP, 231Eh:CCP, 231Ej:CCC, 231Em:CCP, 232Ba:CCC, 232Bb:CCC, 232Bc:CCP, 232Bd:CCC, 232Be:CCP, 232Bg:CCP, 232Bh:CCP, 232Bi:CCP, 232Bj:CCP, 232Bk:CCP, 232Bl:CCP, 232Bm:CCP, 232Bn:CCP, 232Bo:CCP, 232Bp:CCP, 232Bq:CCP, 232Br:CCP, 232Bs:CCC, 232Bt:CCP, 232Bu:CCP, 232Bv:CCP, 232Bx:CCP, 232Bz:CCP, 232Ca:CCC, 232Cb:CCC, 232Cc:CCP, 232Cd:CCP, 232Cf:CCP, 232Cg:CCC, 232Ch:CCP, 232Dc:CCC, 232Fa:CCC, 232Fe:CCC, 234Aa:CCC, 234Ac:CCC, 234Ad:CCC, 234Ae:CCC, 234Af:CCC, 234Ag:CCC, 234Ah:CCC, 234Ai:CCC, 234Aj:CCC, 234Ak:CCC, 234Al:CCC, 234Am:CCC, 234An:CCC, 255Da:???, 255Db:???, M222Aa:CCC

Federal Lands: DOD (Arnold); NPS (Congaree Swamp, Shiloh); USFS (Angelina, Apalachicola, Bienville, Croatan, Davy Crockett, De Soto, Delta, Francis Marion, Holly Springs?, Homochitto, Kisatchie, Oconee, Ouachita, Ozark, Sabine NF, Sam Houston, St. Francis, Tombigbee?); USFWS (Reelfoot)

ALLIANCE SOURCES

References: Allard 1990, Campbell and Grubbs 1992, Campbell pers. comm., Diamond 1993, Evans 1991, Eyre 1980, FNAI 1992a, FNAI 1992b, Faber-Langendoen et al. 1996, Foti 1994b, Foti et al. 1994, Johnson and Bell 1976, Klimas 1988b, Robertson et al. 1984, Schafale pers. comm., Turner et al. 1999, Wharton et al. 1982, Zollner pers. comm.

I.B.2.N.E. TAXODIUM ASCENDENS SEASONALLY FLOODED FOREST ALLIANCE (A.336) POND-CYPRESS SEASONALLY FLOODED FOREST ALLIANCE

ALLIANCE CONCEPT

Summary: Seasonally flooded forests dominated or codominated by *Taxodium ascendens*. Species composition ranges from pure *Taxodium ascendens* to relatively mixed canopy with characteristic canopy and subcanopy/shrub species including *Nyssa biflora*, *Magnolia virginiana*, *Acer rubrum*, *Pinus elliotii* var. *elliottii*, *Persea palustris*, *Cephalanthus occidentalis*, *Annona glabra*, *Morella cerifera* (= *Myrica cerifera*), *Salix caroliniana*, *Ilex cassine*, *Fraxinus caroliniana*, *Cyrilla racemiflora*, *Clethra alnifolia*, *Cliftonia monophylla*, and others. The subcanopy and shrub layers often are dense. Density of the herbaceous stratum varies with duration of flooding. Common species in this stratum include *Woodwardia virginica*, *Saururus cernuus*, *Lachnanthes caroliniana*, *Carex striata*, *Carex turgescens*, *Rhynchospora microcephala* (= *Rhynchospora cephalantha* var. *microcephala*), *Dulichium arundinaceum*, *Osmunda cinnamomea*, *Pontederia cordata*, *Boehmeria cylindrica*, *Triadenum* spp., *Brasenia schreberi*, *Nymphoides* spp., *Nelumbo lutea*, *Cabomba caroliniana*, *Potamogeton* spp., *Rhynchospora macrostachya*, *Rhynchospora inundata*, *Carex* spp., *Utricularia* spp., *Juncus* spp., *Polygonum* spp., and *Hydrocotyle* spp. Some examples may have trees shorter than 5 m, especially around the margins of cypress domes in shallower water and thinner soil, but all are classified here. All of these forests experience water levels that fall below the surface, but some examples will have almost year-round flooding. Topographic setting ranges from depression sinkholes to streamside. Forests in this alliance occur in the outer Coastal Plain from North Carolina to Louisiana.

Related Concepts:

- Cypress Dome (Olmsted et al. 1980b) ?

- Cypress Dome Forest (Hilsenbeck et al. 1979) ?
- Cypress Forests (Gunderson and Loftus 1993) ?
- Cypress Strand Forest (Hilsenbeck et al. 1979) ?
- Cypress/Gum Pond (Ambrose 1990a) I
- Dome Swamp (FNAI 1992a) I Dome Swamp, Cypress Dome subtype (FNAI 1992b) ?
- IIA10a. Pond Cypress Forest (Allard 1990) I
- IIA5b. Coastal Plain Small Stream Swamp Forest (Allard 1990) ?
- Pond Cypress Pond (Nelson 1986) ?
- Pond Cypress Pond Forest (Oberholster 1993) ?
- Pondcypress: 100 (Eyre 1980) I
- Slash Pine-Pond Cypress/Hardwood Forest (Smith 1996a) I
- Small Depression Pond (Schafale and Weakley 1990) I
- Strand Swamp (FNAI 1992a) I
- Strand Swamp, Cypress Strand subtype (FNAI 1992b) ?

Classification Comments: Some of these are actually tropical, occurring in southern Florida; these may need to be placed elsewhere. Associations need to be developed to accommodate some Louisiana communities with a longer hydroperiod. Some of these are almost pure pond-cypress; some are mixed with swamp red maple; some have a very open aspect and are called "Pond-cypress Savannas" (L. Smith pers. comm.). Some of these associations have been moved from semipermanently to seasonally flooded.

ALLIANCE DISTRIBUTION

Range: Forests in this alliance occur in the Outer Coastal Plain from North Carolina south to Florida and west to Louisiana.

Subnations: AL, FL, GA, LA, MS, NC, SC

TNC Ecoregions: 52:P, 53:C, 54:C, 55:C, 56:C, 57:C, 58:P

USFS Ecoregions: 232Ba:CCP, 232Bb:CCP, 232Be:CCC, 232Bf:CCC, 232Bg:CCP, 232Bh:CCC, 232Bi:CCP, 232Bj:CCP, 232Bm:CCP, 232Bn:CCP, 232Bo:CCP, 232Bp:CCP, 232Bq:CCC, 232Br:CCC, 232Bu:CCC, 232Bv:CCC, 232Ca:CCC, 232Cb:CCC, 232Cc:CCP, 232Cd:CCC, 232Ce:CCC, 232Ch:CCC, 232Da:CCP, 232Db:CCP, 232Dc:CCC, 232Ga:CCP, 232Gc:CCP, 411Ab:CCP, 411Ae:CCC, 411Af:CCP, 411Ag:CCC

Federal Lands: DOD (Fort Stewart); NPS (Big Cypress, Everglades); USFS (Apalachicola, Conecuh, Croatan, De Soto, Francis Marion, Ocala, Osceola); USFWS (Bon Secour, Grand Bay)

ALLIANCE SOURCES

References: Allard 1990, Ambrose 1990a, Bennett and Nelson 1991, Brown 1981, Clewell 1971, Clewell 1981, Duever et al. 1984, Ewel and Odum 1984a, Eyre 1980, FNAI 1992a, FNAI 1992b, Gunderson and Loftus 1993, Hilsenbeck et al. 1979, Nelson 1986, Oberholster 1993, Olmsted et al. 1980b, Schafale and Weakley 1990, Smith 1996a, Wharton 1978

I.B.2.N.E. ACER RUBRUM - FRAXINUS PENNSYLVANICA SEASONALLY FLOODED FOREST ALLIANCE (A.316)

RED MAPLE - GREEN ASH SEASONALLY FLOODED FOREST ALLIANCE

ALLIANCE CONCEPT

Summary: This alliance is widely distributed in the eastern United States. Stands are dominated by broad-leaved deciduous trees and well-developed shrub and herbaceous strata. They are characterized by dense growth and a great diversity of species. Basal area can reach 40-42 m²/ha. *Acer rubrum* and *Fraxinus pennsylvanica* are consistently abundant overstory species, but *Fraxinus profunda* (in the southern parts of this alliance's range), *Liquidambar styraciflua*, *Quercus lyrata*, *Quercus bicolor*, and *Ulmus americana* occur almost as frequently, and *Nyssa aquatica* and *Taxodium distichum* occur sporadically in the southern parts of this alliance's range. *Acer saccharinum* may dominate in parts of the range. The shrub layer can include a diverse mixture including *Carpinus caroliniana*, *Cephalanthus occidentalis*, *Forestiera acuminata*, and *Ilex decidua*, but *Itea virginica* is characteristic of southern stands of this alliance. Even with dense shading, the herbaceous layer is usually well-developed, displaying a preponderance of *Boehmeria cylindrica*, *Carex* spp., *Glyceria* spp., *Juncus* spp., *Laportea canadensis*, *Leersia* spp., and *Pilea pumila*. *Vitis* spp. are characteristic vines of this community, but *Toxicodendron radicans* and *Campsis radicans* are also prominent.

Sites which support stands of this alliance have level or nearly level soils that formed in water-deposited clayey or loamy sediments on floodplains of the Mississippi and other rivers and large perennial streams in the Coastal Plain. These soils are flooded or saturated for a significant portion of the growing season, and water may be ponded for most of the year in shallow depressions. Flooding can reach 1 m. Flooding occurs during the winter and spring and often extends into the growing season.

Related Concepts:

- *Acer rubrum* - *Nyssa aquatica* forest (Robertson et al. 1984) ?
- *Acer rubrum* forest alliance (Hoagland 1998a) ? Alluvial Red Maple Swamp (Swain and Kearsley 2001) ?
- Black Ash Swamp (Swain and Kearsley 2001) ?
- Black Ash-Red Maple-Tamarack Calcareous Seepage Swamp (Swain and Kearsley 2001) ?

- Red maple-green ash (Wharton et al. 1982) ?
- Spruce-Fir Boreal Swamp (Swain and Kearsley 2001) ?

Classification Comments: Stands of this alliance support a diverse assemblage of bottomland hardwoods. Perhaps the most diagnostic is the mixture of bottomland hardwoods found there. Species typical of wetter and drier sites are commonly encountered, but the diagnostic environmental feature is shallow standing water or soil saturation for a significant portion of the growing season. Slight ridges within these flooded zones provide drier habitat for less flood-tolerant species.

ALLIANCE DISTRIBUTION

Range: This alliance is widely distributed in the eastern United States in southern Michigan, Ohio, Indiana, Illinois, Wisconsin, southeastern Missouri, eastern Arkansas (?), Georgia, Kentucky, Louisiana, Mississippi, Oklahoma, Tennessee (?), Texas, South Carolina (?), North Carolina, central-western New York and the Lake Erie Plain of Pennsylvania, West Virginia, Maryland, New Jersey, and Virginia; and in Canada in southern Ontario.

Subnations: AR, CT, DE, GA, IL, IN, KY, LA, MA, MD, ME, MI, MO, MS, NB, NC, NH, NJ, NY, OH, OK, ON, PA, QC?, RI, SC, TN?, TX, VA, VT, WI, WV

TNC Ecoregions: 31:C, 36:C, 38:C, 40:P, 42:C, 43:C, 44:C, 45:C, 46:C, 47:P, 48:C, 49:C, 50:C, 51:C, 52:C, 53:P, 56:P, 57:C, 58:C, 59:C, 60:C, 61:C, 62:C, 63:C, 64:C

USFS Ecoregions: 212Cb:CCC, 212Da:C??, 212Ea:CP?, 212Eb:CPP, 212Ec:CPP, 212Fa:CCP, 212Fb:CCP, 212Fc:CCP, 212Fd:CCP, 212Ga:CPP, 212Gb:CPP, 212Hb:CCP, 212Hd:CCC, 212He:CCC, 212Je:CPP, 212Ka:CPP, 221Ab:CCC, 221Ac:CCC, 221Ad:CCC, 221Ae:CCC, 221Af:CCC, 221Ag:CCC, 221Ah:CCP, 221Ai:CCC, 221Ak:CCC, 221Al:CCC, 221Ba:CCC, 221Bb:CCC, 221Bc:CCC, 221Bd:CCP, 221Da:CCC, 221Db:CCP, 221Dc:CCC, 221Ea:CCP, 221Eb:CCP, 221Ed:CC?, 221Ef:CCC, 221Fa:CCC, 221Fb:CCC, 222Ao:CPP, 222Ca:CCP, 222Cb:CCP, 222Cc:CCP, 222Cd:CCP, 222Ce:CCP, 222Cf:CCP, 222Cg:CCP, 222Ch:CCP, 222Db:CCC, 222Df:CCC, 222Eg:CCP, 222Ek:CCC, 222Ga:CCC, 222Ha:CCC, 222Hb:CCC, 222Ia:CCC, 222Ic:CCP, 222Id:CCP, 222Ie:CC?, 222If:CCC, 222Ig:CCC, 222Ja:CC?, 222Je:CCC, 222Jg:CCC, 222Jh:CCC, 222Ji:CCC, 222Jj:CCC, 222Ke:CCC, 222Kf:CCC, 231Aa:CCC, 231Ae:CCP, 231Af:CCP, 231Ak:CCP, 231Al:CCP, 231Am:CCP, 231An:CCP, 231Ao:CCP, 231Ap:CCP, 231Gb:CCC, 231Gc:CCC, 232Aa:CCP, 232Ad:CCC, 232Ba:CCP, 232Bb:CC?, 232Bc:CCP, 232Bd:CC?, 232Be:CC?, 232Bf:CC?, 232Bg:CC?, 232Bh:CC?, 232Bi:CC?, 232Bj:CC?, 232Bk:CC?, 232Bl:CC?, 232Bm:CC?, 232Bn:CC?, 232Bo:CC?, 232Bp:CC?, 232Bq:CC?, 232Br:CCC, 232Bs:CCC, 232Bt:CCC, 232Bu:CC?, 232Bv:CC?, 232Bx:CCC, 232Bz:CC?, 232Ca:CC?, 232Cb:CC?, 232Cd:CC?, 232Ce:CC?, 232Cf:CC?, 232Cg:CC?, 232Ch:CCC, 232Ci:CC?, 232Cj:CC?, 232Dc:CCC, 234Aa:CCC, 234Ac:CCC, 234Ad:CCP, 234Ae:CCP, 234Af:CCC, 234Ag:CCP, 234Ah:CCC, 234Ai:CC?, 234Aj:CCP, 234Ak:CCP, 234Al:CCP, 234Am:CCP, 234An:CCP, 251Dg:CCC, 255Db:CCC, M212Ad:CP?, M212Bb:CCP, M212Bc:CCC, M212Bd:CCC, M212Ca:CC?, M212Cb:CCC, M212Cc:CCC, M212Cd:CC?, M212D:CP, M221Aa:CCP, M221Ab:CCC, M221Bb:CCP, M221Bd:CCP, M221Be:CCC, M221Ca:CP?, M221Cb:CPP, M221Da:CCP, M221Dc:CCC, M222A:??, M231A:??

Federal Lands: NPS (Acadia, Congaree Swamp, Great Smoky Mountains); USFS (Daniel Boone?, Francis Marion?, Ouachita?, Ozark?, Pisgah); USFWS (Little River, Reelfoot?, San Bernard)

ALLIANCE SOURCES

References: Faber-Langendoen et al. 1996, Golet et al. 1993, Hoagland 1998a, Robertson et al. 1984, Swain and Kearsley 2001, Wharton et al. 1982

I.B.2.N.f. Semipermanently flooded cold-deciduous forest

I.B.2.N.F. NYSSA AQUATICA - (TAXODIUM DISTICHUM) SEMIPERMANENTLY FLOODED FOREST ALLIANCE (A.345)

WATER TUPELO - (BALD-CYPRESS) SEMIPERMANENTLY FLOODED FOREST ALLIANCE

ALLIANCE CONCEPT

Summary: This alliance encompasses semipermanently flooded forested riverine swamps dominated by *Nyssa aquatica*, with or without *Taxodium distichum* as a codominant. Stands of this alliance may vary in composition from ones largely dominated by *Nyssa* to ones dominated by a mix of *Taxodium*, *Nyssa*, and other hardwood species. Dominance of *Nyssa* may vary conceptually from 100-25%. Dominance of *Taxodium* may vary from less than 75% to absent. Other canopy and subcanopy species may include *Nyssa biflora*, *Quercus lyrata*, *Carya aquatica*, *Fraxinus profunda*, *Fraxinus caroliniana*, *Planera aquatica*, and *Populus heterophylla*. Shrubs and herbs are typically limited to tree bases, fallen logs, and other elevated places in the stand. *Itea virginica* is often the only shrub present. Herbaceous species may be absent and often are sparse. Species present can include *Phanopyrum gymnocarpon* (= *Panicum gymnocarpon*), *Pluchea camphorata*, *Boehmeria cylindrica*, *Rudbeckia laciniata*, *Sagittaria latifolia*, *Onoclea sensibilis*, *Triadenum walteri*, *Carex jorii*, *Carex glaucescens*, *Proserpinaca pectinata*, *Asclepias perennis*, *Saururus cernuus*, *Justicia ovata*, *Leersia lenticularis*, and others. Associations in this alliance occur in backwater sloughs, low wet flats, swales and backswamps, and along blackwater streams and other alluvial settings. Related vegetation associated with artificial lakes and millponds are accommodated in another alliance, *Taxodium distichum* - (*Taxodium ascendens*) Seasonally Flooded Lakeshore Woodland Alliance (A.652). Surface water is present throughout the growing season in most years. Forests in this alliance occur virtually throughout the Atlantic and Gulf coastal plains and the Mississippi River Alluvial Plain within the range of *Nyssa aquatica*, and in the Arkansas River Valley; also reported from the Mobile and Tensaw rivers in Alabama.

Related Concepts:

- Baldcypress - Tupelo: 102 (Eyre 1980) I
- Baldcypress / *Ceratophyllum* Semi-Permanently Flooded Swamps (Turner et al. 1999) I
- Baldcypress-Water Tupelo Series (Diamond 1993) I
- Cypress - Tupelo Swamp (Foti 1994b) ?
- IIA4b. Bald Cypress - Water Tupelo Swamp (Allard 1990) I
- IIA4c. Bald Cypress - Swamp Black Gum Swamp (Allard 1990) I
- IIA4d. Tupelo Swamp (Allard 1990) I P1B3dI1a. *Taxodium distichum* (Foti et al. 1994) ?
- P1B3dI1b. *Taxodium distichum* - *Nyssa aquatica* (Foti et al. 1994) ? P1B3dII3a. *Nyssa aquatica* (Foti et al. 1994) ?
- Tupelo Blackgum Swamp (Foti 1994b) ?
- Water Tupelo - Swamp Tupelo: 103 (Eyre 1980) I

Classification Comments: Compare with seasonally flooded alliances (I.B.2.N.e) which have no surface water present by the end of the growing season in most years. There is an association that occurs in semipermanently flooded sloughs that is dominated by *Nyssa ogeche* under scattered *Nyssa aquatica*; its alliance placement needs assessment.

ALLIANCE DISTRIBUTION

Range: Forests in this alliance occur virtually throughout the Atlantic and Gulf coastal plains and the Mississippi River Alluvial Plain within the range of *Nyssa aquatica*, and in the Arkansas River Valley; also reported from the Mobile and Tensaw rivers in Alabama. This alliance is found in Illinois, Indiana, Missouri, Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, and Virginia, and possibly Ohio (?).

Subnations: AL, AR, FL, GA, IL, IN?, KY, LA, MO, MS, NC, SC, TN, TX, VA

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

USFS Ecoregions: 222A:CC, 222Cb:CC?, 222Cc:CC?, 222Cd:CC?, 222Ce:CC?, 222D:CC, 231Bc:CCC, 231E:C?, 231Ga:CCC, 231Gb:CCC, 232Bn:CCC, 232Br:CCC, 232Bs:CCC, 232Bv:CCC, 232Cb:CCC, 232Ce:CCC, 232Cf:CCC, 232Cg:CCC, 232Ch:CCC, 232Cj:CCC, 232Dc:CCC, 232Fa:CCC, 232Fb:CCC, 232Fc:CCC, 232Fd:CCC, 232Fe:CCC, 234Aa:CCC, 234Ac:CCC, 234Ad:CCC, 234Ae:CCC, 234Af:CCC, 234Ag:CCC, 234Ah:CCC, 234Ai:CCC, 234Aj:CCC, 234Ak:CCC, 234Al:CCC, 234Am:CCC, 234An:CCC

Federal Lands: DOD (Fort Benning, Pine Bluff Arsenal); DOE (Savannah River Site); NPS (Congaree Swamp, Shiloh); USFS (Angelina?, Apalachicola, Conecuh?, Croatan, Davy Crockett, De Soto, Delta, Francis Marion, Kisatchie, Ocala, Ozark, Sabine NF?, Sam Houston, St. Francis, Talladega, Tuskegee); USFWS (Hatchie, Lower Hatchie?)

ALLIANCE SOURCES

References: Allard 1990, Conner and Day 1976, Devall 1991, Diamond 1993, Eyre 1980, Faber-Langendoen et al. 1996, Foti 1994a, Foti 1994b, Foti et al. 1994, Fowells 1965, Hardin 1990, Klawitter 1962, Leitman et al. 1983, Miller and Neiswender 1989, Monk 1968, Schneider et al. 1989, Turner et al. 1999, Wharton et al. 1982, Whipple et al. 1981

I.B.2.N.g. Saturated cold-deciduous forest

I.B.2.N.G. NYSSA BIFLORA - ACER RUBRUM - (LIRIODENDRON TULIPIFERA) SATURATED FOREST ALLIANCE (A.351) SWAMP BLACKGUM - RED MAPLE - (TULIPTREE) SATURATED FOREST ALLIANCE

ALLIANCE CONCEPT

Summary: Forests codominated by *Nyssa biflora* and *Acer rubrum* occurring on extensive peat flats in the Coastal Plain, in seepage-fed edges of floodplains or on slopes wet by nearly constant seepage. The hydrology is constantly saturated, and soils are acid and organic. *Liriodendron tulipifera* is a common woody species in these forests, as are *Liquidambar styraciflua*, *Magnolia virginiana*, *Oxydendrum arboreum*, *Acer rubrum*, *Persea palustris*, *Fraxinus pennsylvanica*, *Quercus laurifolia*, *Ulmus rubra*, *Quercus michauxii*, *Pinus taeda*, and *Carpinus caroliniana*. Some of these forests, particularly those on peat flats, may result from logging of former *Chamaecyparis thyooides*-dominated swamps. *Leucothoe axillaris*, *Ilex coriacea*, *Morella caroliniensis* (= *Myrica heterophylla*), *Toxicodendron vernix*, and *Lyonia lucida* are common dominants in the shrub layer, with *Itea virginica*, *Clethra alnifolia*, *Persea palustris*, *Ilex glabra*, *Rhododendron flammeum*, and *Arundinaria gigantea* also often present. *Sphagnum* spp. are common in the ground layer, as well as *Carex atlantica* ssp. *capillacea*, *Carex bromoides* ssp. *bromoides*, *Saururus cernuus*, *Boehmeria cylindrica*, *Osmunda cinnamomea*, *Osmunda regalis* var. *spectabilis*, *Hydrocotyle verticillata* var. *verticillata*, *Woodwardia areolata*, *Macbridea caroliniana*, *Sagittaria fasciculata*, *Ludwigia palustris*, and *Mitchella repens*. These forests occur in the Piedmont on small to medium streams on seepage-fed edges where there is more *Acer rubrum* than *Nyssa biflora*, in the Ridge and Valley of Georgia and in the East Gulf Coastal Plain on slopes in a longleaf pine-dominated upland. Examples of forests in this alliance are known from the Atlantic Coastal Plain from Virginia to Georgia, the Upper East Gulf Coastal Plain of Alabama, the East Gulf Coastal Plain of Mississippi, and likely other adjacent states as well.

Related Concepts:

- Nonriverine Swamp Forest (Schafale and Weakley 1990) ?

Classification Comments: Occurs on the Bunched Arrowhead Preserve (TNC) in South Carolina.

ALLIANCE DISTRIBUTION

Range: Examples of forests in this alliance are known from the Atlantic Coastal Plain from Virginia to Georgia and the East Gulf Coastal Plain of Mississippi, but likely other surrounding states as well. This alliance is found in Florida, Georgia, Mississippi, North Carolina, South Carolina, and Virginia, and possibly in Alabama (?) and Louisiana (?).

Subnations: AL, FL, GA, LA?, MS, NC, SC, VA

TNC Ecoregions: 43:C, 52:P, 53:C, 56:C, 57:C, 58:C

USFS Ecoregions: 231Aa:CCC, 231Ac:CC?, 231Ad:CCC, 231Ae:CC?, 231Af:CC?, 231Aj:CC?, 231Ao:CC?, 231Bc:CCC, 231Dc:CCC, 231Dd:CC?, 231De:CCC, 232Ba:CCP, 232Bb:CCP, 232Bc:CCP, 232Bj:CCC, 232Bk:CCP, 232Bl:CCP, 232Bm:CCP, 232Bn:CCP, 232Bo:CCP, 232Bp:CCP, 232Bq:CCC, 232Br:CCC, 232Bs:CCC, 232Bu:CC?, 232Bv:CC?, 232Ca:CCC, 232Cb:CCC, 232Ch:CCC, 232Dc:CCC, 234Aa:???, 234Ag:???

Federal Lands: DOD (Fort Benning, Fort Bragg, Fort Gordon, Fort Jackson, Fort Stewart); DOE (Savannah River Site); NPS (Congaree Swamp); USFS (Apalachicola, Bienville, Conecuh?, Croatan, De Soto?, Francis Marion, Talladega); USFWS (Carolina Sandhills, Eufaula, Great Dismal Swamp)

ALLIANCE SOURCES

References: Fleming 1998, Jones et al. 1981a, Schafale and Weakley 1990

I.B.2.N.h. Tidal cold-deciduous forest

I.B.2.N.H. NYSSA BIFLORA - (NYSSA AQUATICA, TAXODIUM DISTICHUM) TIDAL FOREST ALLIANCE (A.357)

SWAMP BLACKGUM - (WATER TUPELO, BALD-CYPRESS) TIDAL FOREST ALLIANCE

ALLIANCE CONCEPT

Summary: This alliance accommodates tidally flooded forests in lower, estuarine reaches of brownwater and blackwater rivers in the Outer Coastal Plain (tidewater), and also along estuarine shores. Flooding can be either lunar-tidal or wind-tidal, and can be affected as well by riverine flooding events. The trees often have a stressed appearance, and the herbaceous layer usually is well-developed and more species-rich than in most non-tidal swamps, possibly as a result of the tidal nutrient input. Various combinations of *Nyssa biflora*, *Taxodium distichum*, and *Nyssa aquatica* usually dominate the canopy. On blackwater rivers, *Nyssa aquatica* is often an indicator of tidal condition, presumably because it requires the higher nutrients provided by tidal flooding. Other species common in tidal situations, such as *Morella cerifera* (= *Myrica cerifera*), *Lilaeopsis carolinensis*, *Peltandra virginica*, *Thelypteris palustris* var. *pubescens*, *Osmunda regalis* var. *spectabilis*, and *Rosa palustris*, are often common. Typical species of non-tidal swamps, such as *Quercus lyrata*, *Carya aquatica*, *Quercus phellos*, *Smilax laurifolia*, *Ilex glabra*, *Lyonia lucida*, *Woodwardia virginica*, *Sphagnum* spp., *Chamaecyparis thuyoides*, *Cyrilla racemiflora*, and others, are absent.

Related Concepts:

- Bald Cypress/Black Gum Community Type (Odum et al. 1984) ?
- Baldcypress - Tupelo: 102 (Eyre 1980) I
- Tidal Cypress--Gum Swamp (Schafale and Weakley 1990) ?
- Tidal stream floodplain forest (Ambrose 1990a) ?
- Tidewater River and Swamp System (Wharton 1978) ?

Classification Comments: Forests containing *Taxodium distichum* in tidally influenced situations are reported from "wind tidal areas on the edges of Lake Pontchartrain" by L. Smith (pers. comm.), but as far as is known, this Pontchartrain vegetation can be treated in non-tidal types because the influence of tidal flooding has trivial effects on composition.

ALLIANCE DISTRIBUTION

Range: This alliance is found in Alabama, Florida, Georgia, Mississippi, North Carolina, South Carolina, Maryland, and Virginia.

Subnations: AL, FL, GA, MS, NC, SC, VA?

TNC Ecoregions: 53:C, 55:C, 56:C, 57:C, 58:P

USFS Ecoregions: 232Bs:CCC, 232Bx:CCP, 232Bz:CC?, 232Cb:CCC, 232Ce:CCC, 232Ch:CCC, 232Dc:CCC, 232Eb:CCP

Federal Lands: USFS (Croatan, Francis Marion); USFWS (Alligator River, Lower Suwannee)

ALLIANCE SOURCES

References: Ambrose 1990a, Beaven and Oosting 1939, Eyre 1980, Fleming 1998, McCormick and Somes 1982, Odum et al. 1984, Schafale and Weakley 1990, Smith pers. comm., Wharton 1978

I.C.3.N.a. Mixed needle-leaved evergreen - cold-deciduous forest

I.C.3.N.A. PINUS TAEDA - QUERCUS (ALBA, FALCATA, STELLATA) FOREST ALLIANCE (A.404)

LOBLOLLY PINE - (WHITE OAK, SOUTHERN RED OAK, POST OAK) FOREST ALLIANCE

ALLIANCE CONCEPT

Summary: This alliance encompasses loblolly pine - oak forests of the Coastal Plain and some adjacent provinces of the eastern United States. The canopy is dominated by *Pinus taeda* with some combination of the nominal oaks. More mesic examples tend to be codominated by *Quercus alba*, while dry to dry-mesic examples are usually codominated by *Quercus falcata*. Associated species vary by geography, substrate, and exposure. Described members of this alliance are found sporadically, ranging from the North Atlantic Coast of Delaware, through the Chesapeake Lowlands of Maryland and Virginia to the West Gulf and Upper West Gulf coastal plains of eastern Texas and Arkansas where they are most common. These forests are apparently absent from the Mid-Atlantic Coastal Plain of North and South Carolina, but are documented in the South Atlantic Coastal Plain of Georgia. Successional and/or semi-natural examples are known from the East Gulf and Upper East Gulf coastal plains. Within the longleaf pine belt, these forests can occur naturally on fire-protected areas such as topographically isolated hilltops, mid to lower slopes, protected ravines, broad flats and second bottoms. In some cases, they are successional forests on broad uplands following clearing or alteration of natural forests, especially those historically dominated by *Pinus palustris*. A broad range of associated species may be present in this type, including *Carya alba*, *Carya texana*, *Nyssa sylvatica*, *Liquidambar styraciflua*, *Carya cordiformis*, *Magnolia grandiflora*, *Fagus grandifolia*, *Quercus velutina*, *Quercus michauxii*, *Quercus pagoda*, and *Acer rubrum*. The subcanopy can include canopy species, as well as *Ilex opaca* var. *opaca*, *Ostrya virginiana*, *Carpinus caroliniana*, *Cornus florida*, and others. *Callicarpa americana*, *Symplocos tinctoria*, *Morella cerifera* (= *Myrica cerifera*), *Vaccinium elliotii*, *Viburnum dentatum*, and *Viburnum acerifolium* are common shrub species. Herbaceous species that may be present include *Polystichum acrostichoides*, *Athyrium filix-femina* ssp. *asplenioides*, *Phegopteris hexagonoptera*, *Prenanthes altissima*, *Spigelia marilandica*, *Mitchella repens*, *Podophyllum peltatum*, *Phlox divaricata*, *Tipularia discolor*, *Arisaema triphyllum*, *Erigeron pulchellus*, *Lilium michauxii*, *Chasmanthium laxum*, *Chasmanthium sessiliflorum*, and *Melica mutica*.

Related Concepts:

- Calcareous Forest (Smith 1996a) I
- Dry-Mesic Mixed Oak - Pine Forest (Wieland 1994b) ?
- IA6e. Loblolly Pine - Shortleaf Pine - Oak Forest (Allard 1990) I
- Loblolly Pine - Hardwood: 82 (Eyre 1980) ?
- Loblolly Pine-Oak Series (Diamond 1993) ?
- Lowland Pine - Oak Forest (Foti 1994b) ?
- Mixed Hardwood-Loblolly Pine Forest (Smith 1996a) I
- T1B3aIII4a. *Pinus echinata* - *Pinus taeda* - *Quercus* spp. (*stellata*, *alba*, *falcata*) (Foti et al. 1994) ?
- White Oak - Loblolly Pine/*Callicarpa* Loamy Mesic Lower Slopes and Terraces (Turner et al. 1999) I

Classification Comments: None

ALLIANCE DISTRIBUTION

Range: This alliance encompasses pine-oak forests of the Coastal Plain and some adjacent provinces from Virginia to Texas. This includes the mesic to dry-mesic loblolly pine-oak-hickory forests of Arkansas, Louisiana, and Texas; dry forests on flats in the Piedmont of, at least, North Carolina and South Carolina that are dominated by *Pinus taeda* with a combination of the nominal oaks; and related vegetation in the East Gulf and Atlantic coastal plains.

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

TNC Ecoregions: 31:C, 40:C, 41:C, 43:P, 44:P, 50:?, 52:P, 53:C, 56:C, 57:C, 58:C, 62:C

USFS Ecoregions: 231Aa:CCC, 231Ac:CCC, 231Ae:CCC, 231Af:CCC, 231Ah:CCP, 231Ba:CCP, 231Bc:CCP, 231Bd:CCC, 231Be:CCC, 231Bg:CCP, 231Bh:CCP, 231Bi:CCC, 231C:CC, 231Ea:CCC, 231Ee:CCC, 231Ef:CCC, 231Eg:CCC, 231Eh:CCC, 231Ei:CCC, 231Ej:CCC, 231En:CCC, 231Fa:CCC, 232Ac:CCC, 232Ad:CCC, 232Ba:CCC, 232Bb:CCC, 232Bi:CCP, 232Bj:CCP, 232Bk:CCP, 232Bl:CCC, 232Bm:CCP, 232Bn:CCC, 232Bo:CCP, 232Bq:CCC, 232Br:CCC, 232Bt:CCC, 232Bu:CCC, 232Bv:CCC, 232Bx:CCC, 232Bz:CCC, 232Ca:CCC, 232Cb:CCC, 232Ce:CCC, 232E:C?, 232Fa:CCC, 232Fb:CCC, 232Fe:CCC, 234Ab:PP?, 234Ac:PPP, 234Ah:PPP, 255:?

Federal Lands: DOD (Fort Benning); NPS (Chickamauga-Chattanooga, Kennesaw Mountain, Rock Creek); USFS (Angelina, Apalachicola?, Bienville, Conecuh, Croatan?, Davy Crockett, De Soto, Francis Marion, Holly Springs, Homochitto, Kisatchie, Oconee, Sabine NF, Sam Houston, St. Francis, Sumter?, Talladega, Tombigbee, Tuskegee, Uwharrie?); USFWS (Eufaula, Noxubee?)

ALLIANCE SOURCES

References: Allard 1990, Baker and Langdon 1990, Clarke et al. 2000, Diamond 1993, Eyre 1980, Foti 1994b, Foti et al. 1994, Golden 1979, Martin and Smith 1991, Martin and Smith 1993, Smith 1996a, Smith pers. comm., Turner et al. 1999, Wieland 1994b

I.C.3.N.b. Temporarily flooded mixed needle-leaved evergreen - cold-deciduous forest

I.C.3.N.B. *PINUS GLABRA* - *QUERCUS* (*LAURIFOLIA*, *MICHAUXII*, *NIGRA*) TEMPORARILY FLOODED FOREST ALLIANCE (A.431)

SPRUCE PINE - (DIAMONDLEAF OAK, SWAMP CHESTNUT OAK, WATER OAK) TEMPORARILY FLOODED FOREST ALLIANCE

ALLIANCE CONCEPT

Summary: Vegetation in this alliance occurs on natural levees and on infrequently flooded flats in floodplains of Coastal Plain streams, both blackwater and brownwater, from South Carolina south to Florida, and west to Mississippi and possibly to eastern Louisiana. *Pinus glabra* and sometimes also *Pinus taeda* are typically mixed with *Quercus laurifolia*, *Quercus phellos*, *Liquidambar styraciflua*, *Quercus nigra*, and *Quercus michauxii*. *Carpinus caroliniana ssp. caroliniana* typically forms a prominent subcanopy stratum. In Mississippi, *Sabal minor* may be common in some examples. Shrubs may include *Hypericum galioides*, *Hypericum hypericoides*, *Sebastiania fruticosa*, *Leucothoe racemosa*, *Cyrilla racemiflora*, *Styrax americanus*, *Crataegus marshallii*, and *Rhododendron canescens*. Vines include *Berchemia scandens* and *Vitis rotundifolia*. Herbs may include *Chasmanthium laxum*, *Saccharum baldwinii*, *Carex jorii*, *Osmunda cinnamomea*, and *Mitchella repens*. In Louisiana, small, relatively pure stands of *Pinus glabra* can occur as a natural or artificial small-scale successional type, found in 'slashes' in flatwoods.

Related Concepts:

- Diamondleaf Oak/Spruce Pine Flat subtype (FNAI 1992b) ?
- Floodplain Forest (FNAI 1992a) I
- IIA8c. Lowland Pine - Oak Forest (Allard 1990) I
- Swamp chestnut oak-cherrybark oak-spruce pine (Wharton et al. 1982) ?

Classification Comments: None

ALLIANCE DISTRIBUTION

Range: Vegetation in this alliance occurs from South Carolina south to Florida, and west to Mississippi and possibly to eastern Louisiana.

Subnations: AL, FL, GA, MS, SC

TNC Ecoregions: 53:C, 56:C, 57:P

USFS Ecoregions: 232Ba:CCC, 232Bb:CC?, 232Bg:CCC, 232Bh:CCC, 232Bi:CC?, 232Bj:CCP, 232Bk:CCC, 232Bm:CC?, 232Bn:CC?, 232Bo:CC?, 232Bp:CC?, 232Br:CCC, 232Bs:CCC, 232Bu:CCP, 232Ca:CCP, 232Cb:CCP

Federal Lands: USFS (Apalachicola, Bienville, Conecuh?, De Soto, Francis Marion?, Homochitto, Osceola?)

ALLIANCE SOURCES

References: Allard 1990, Ewel 1990a, FNAI 1992a, FNAI 1992b, Wharton et al. 1982

II. Woodland

II.A.2.N.a. Temperate broad-leaved evergreen woodland

II.A.2.N.A. *QUERCUS VIRGINIANA* - *JUNIPERUS VIRGINIANA* - (*SABAL PALMETTO*)

WOODLAND ALLIANCE (A.479)

LIVE OAK - EASTERN RED-CEDAR - (*CABBAGE PALMETTO*) WOODLAND ALLIANCE

ALLIANCE CONCEPT

Summary: This alliance accommodates calciphilic communities occurring on coastal sands, Amerindian shell middens, and natural shell deposits of the Outer Coastal Plain. Composition varies along a latitudinal gradient; associations have been defined for two separate geographic zones, one of the Atlantic Coast from northern Florida north to Virginia, and another in the Gulf Coast from Florida west to Texas. This vegetation occurs under more severe and unstable conditions than related forests, which are found in the I.A.4.N.a *Quercus virginiana* - (*Sabal palmetto*) Forest Alliance (A.55).

Related Concepts:

- Live Oak: 89 (Eyre 1980) I

Classification Comments: None

ALLIANCE DISTRIBUTION

Range: Associations have been defined for two separate geographic zones, one of the Atlantic Coast from northern Florida north to southeastern Virginia, and another in the Gulf Coast from Florida west to Texas.

Subnations: AL, FL, GA, LA, MS, NC, SC, TX?, VA

TNC Ecoregions: 31:C, 53:C, 54:P, 55:C, 56:C, 57:C, 58:C

USFS Ecoregions: 231Fb:PPP, 232Ce:CCC, 232Ch:CCC, 232Dc:CCC, 232Eb:CCC, 232Ec:CCC, 232Gb:CCP, 255Dc:PPP, 411Ad:PPP, 411Ae:PPP, 411Af:PPP, 411Ag:PPP

Federal Lands: NPS (Fort Pulaski); USFS (Francis Marion)

ALLIANCE SOURCES

References: Dorroh 1971, Eleuterius and Otvos 1979, Eyre 1980, Fleming et al. 2001, Sandifer et al. 1980, Schafale and Weakley 1990, Sharitz 1975, Wharton 1978, Wieland 1994b

II.A.4.N.a. Rounded-crowned temperate or subpolar needle-leaved evergreen woodland

II.A.4.N.A. *PINUS PALUSTRIS* / *QUERCUS* SPP. WOODLAND ALLIANCE (A.499) LONGLEAF PINE / OAK SPECIES WOODLAND ALLIANCE

ALLIANCE CONCEPT

Summary: This alliance includes all *Pinus palustris*-dominated vegetation on dry to xeric sites in the southeastern United States. These types include 'longleaf pine sandhills' of the Atlantic and Gulf coastal plains; other dry to xeric substrates of the East Gulf and West Gulf coastal plains; as well as 'montane longleaf' on rocky substrates of the Piedmont, Cumberland Plateau, and Ridge and Valley. Longleaf pine sandhills include a variety of xeric to dry-mesic *Pinus palustris* communities, characterized by the presence of one or more scrub oaks, most characteristically including *Quercus incana*, *Quercus laevis*, *Quercus margarettiae*, *Quercus myrtifolia*, *Quercus geminata*, *Quercus minima*, *Quercus arkansana*, *Quercus chapmanii*, *Quercus stellata*, and *Quercus marilandica*, sometimes in combination with the more mesic oaks *Quercus virginiana*, *Quercus falcata*, *Quercus pumila*, and *Quercus nigra*. The more montane examples may contain *Quercus prinus*, *Quercus coccinea*, *Quercus falcata*, *Pinus echinata*, and *Pinus virginiana*. The structure of examples of these communities is highly variable, depending on fire frequency. Generally, appropriately fire-managed examples of these communities have an open canopy of *Pinus palustris*, with scattered tree-sized individuals of the *Quercus* spp.; the oaks are otherwise reduced to sprouts. Under lower fire frequency, these communities often develop a dense subcanopy, shrub layer, or even canopy of scrub oaks. In addition, fire suppression may promote ingrowth of other pines, particularly *Pinus clausa*, *Pinus echinata*, and/or *Pinus taeda*. Where a well-developed shrub stratum is present, common shrubs include *Vaccinium stamineum*, *Vaccinium arboreum*, *Vaccinium virgatum*, *Vaccinium tenellum*, *Gaylussacia dumosa* (= var. *dumosa*), *Gaylussacia frondosa* (= var. *frondosa*), *Gaylussacia nana* (= *Gaylussacia frondosa* var. *nana*), *Gaylussacia tomentosa* (= *Gaylussacia frondosa* var. *tomentosa*), *Ilex vomitoria*, *Rhus copallinum*, *Asimina parviflora*, and *Morella cerifera* (= *Myrica cerifera*). *Aristida stricta* or *Aristida beyrichiana* are also dominant or at least present within their ranges in the herbaceous layer of many associations. Other characteristic grasses include *Sporobolus junceus*, *Aristida purpurascens*, *Schizachyrium scoparium*, *Andropogon gyrans*, and *Andropogon ternarius*. Soils of this alliance include sandy Entisols, plinthic and aquic Ultisols, Alfisols and occasionally Spodosols. Soils vary in texture from deep sands to well-drained loams with a strong clay component. Montane examples occur on rocky ridges comprised of various rock types including sandstone, quartzite, phyllite, mica schists, and gneiss.

Related Concepts:

- Bluejack Oak-Pine Series (Diamond 1993) I
- Coastal Fringe Sandhill (Schafale and Weakley 1990) ?
- IB6a. Western Xeric Sandhill (Allard 1990) ?
- IB6b. Southeastern Coastal Plain Xeric Sandhill (Allard 1990) ?
- IB6c. Southeastern Coastal Plain Subxeric Pine - Oak Sandhill (Allard 1990) I
- IB6d. Southeastern Coastal Plain Subxeric Longleaf Pine - Saw Palmetto Woodland (Allard 1990) ?
- Longleaf Pine - Bluejack Oak / *Tragia* Grossarenic Dry Uplands (Turner et al. 1999) I
- Longleaf Pine: 70 (Eyre 1980) I
- Mesic Pine Flatwoods (Schafale and Weakley 1990) ?
- Pine/Scrub Oak Sandhill, Mesic Transition Variant (Schafale 1994) ?
- Pine/Scrub Oak Sandhill, Mixed Oak Variant (Schafale 1994) ?
- Pine/Scrub Oak Sandhill, Northern Variant (Schafale 1994) ?
- Sandhill (FNAI 1992a) I
- Western Wet/Mesic Longleaf Pine Savannah/Flatwoods (Smith 1996a) I
- Xeric Sandhill Scrub, Coastal Fringe Variant (Schafale 1994) ?
- Xeric Sandhill Scrub, Coastal Plain Variant (Schafale 1994) ?
- Xeric Sandhill Scrub, Sand Barren Variant (Schafale 1994) ?

Classification Comments: This alliance includes vegetation referred to as 'longleaf pine sandhills' of the Atlantic and Gulf coastal plains; other dry to xeric substrates of the East Gulf and West Gulf coastal plains; as well as 'montane longleaf' on rocky substrates of the Piedmont, Cumberland Plateau, and Ridge and Valley. Some of these associations, because of their inland geography and/or a history of disturbance and/or fire suppression, contain other pine species (*Pinus echinata* and/or *Pinus taeda*) or oaks in their canopies. Depending on fire interval, the canopy closure may temporarily exceed 60%. Despite this, all are now placed here. Some examples of this condition include fire-suppressed or otherwise ecologically disturbed longleaf pine woodlands from the coastal plains with tall and dense scrub oaks that enter the canopy, or mixed pine woodlands within the natural range of *Pinus palustris* and at least partially dominated by it. The pine canopy component is typically a mixture of pine species; this usually arises from ingrowth of the less fire-tolerant pines (*Pinus echinata*, *Pinus taeda*) into natural, planted, or managed stands of *Pinus palustris*. In addition, included here are naturally mixed pine - oak stands which have a canopy containing *Pinus palustris* with a mixture of other pines and oaks, in the Piedmont and Ridge and Valley of Georgia, in the Ridge and Valley of Alabama, and possibly other areas outside of the Coastal Plain. In some of these associations, the original composition and canopy closure are speculative; a higher canopy closure (greater than 60%) may be the result of fire suppression in woodlands more typically dominated by *Pinus palustris*. Oaks present may include *Quercus stellata*, *Quercus marilandica*, *Quercus prinus*, *Quercus margarettiae*, *Quercus incana*, and *Quercus falcata*, which will frequently be present in the understory or also scattered in the overstory, depending on the moisture regime. *Quercus coccinea* and *Quercus georgiana* are more rarely found. The woodland structure may be wholly 'natural,' or it may have been created and

maintained by silvicultural techniques designed to replicate this natural condition. At many sites, both forest and woodland communities may be present, grading into one another depending on aspect, surface geology, or fire history.

ALLIANCE DISTRIBUTION

Range: This alliance is found in the Coastal Plain province from Virginia south to south-central Florida, and west to eastern Texas. It also extends inland to "hard rock" provinces (Piedmont, Cumberland Plateau, Ridge and Valley) of Alabama, Georgia, and North Carolina. Overall, this alliance is found in Alabama, Florida, Georgia, Louisiana, Mississippi, North Carolina, South Carolina, Texas, and Virginia.

Subnations: AL, FL, GA, LA, MS, NC, SC, TX, VA

TNC Ecoregions: 31:C, 40:C, 41:C, 43:C, 50:C, 52:C, 53:C, 55:C, 56:C, 57:C

USFS Ecoregions: 231Aa:CCC, 231Ab:CC?, 231Ac:CCC, 231Af:CCC, 231Ai:CCP, 231Aj:CCC, 231Ao:CC?, 231Bc:CCC, 231Bd:CCC, 231Bj:CCP, 231Ca:CCC, 231Da:CC?, 231Db:CCC, 231Dc:CCC, 231Dd:CCC, 231De:CC?, 231Ea:CCC, 231Eg:CCP, 231Fa:CCC, 232Ba:CCC, 232Bb:CCC, 232Bc:CCP, 232Be:CCP, 232Bf:CCC, 232Bg:CCC, 232Bh:CCC, 232Bj:CCC, 232Bk:CCC, 232Bl:CCC, 232Bm:CCP, 232Bn:CCC, 232Bo:CCP, 232Bp:CCP, 232Bq:CCC, 232Br:CCC, 232Bu:CCP, 232Bv:CCC, 232Ca:CCC, 232Cb:CCC, 232Cc:CCP, 232Ce:CCC, 232Cf:CCP, 232Ch:CCC, 232Da:CCP, 232Db:CCC, 232Dc:CCC, 232Ea:CCC, 232Eb:CCP, 232Fa:CCC, 232Fb:CCC, 232Fe:CCC, 232Ga:CP?, 232Gb:CCP, 232Gc:CCP, 411Ac:CCP, 411Af:CCC

Federal Lands: DOD (Camp Lejeune, Camp Shelby, Eglin, Fort Benning, Fort Bragg, Fort Gordon, Fort Jackson, Fort McClellan, Fort Stewart, Sunny Point); NPS (Big Thicket); USFS (Angelina, Apalachicola, Bankhead, Bienville, Chattahoochee, Conecuh, Croatan, Davy Crockett, De Soto, Francis Marion, Homochitto?, Kisatchie, Ocala, Osceola, Sabine NF, Sam Houston, Talladega, Tuskegee, Uwharrie); USFWS (Eufaula)

ALLIANCE SOURCES

References: Allard 1990, Allen 1956, Bridges and Orzell 1989a, Diamond 1993, Eyre 1980, FNAI 1992a, FNAI 1992b, MacRoberts and MacRoberts 1992, Martin and Smith 1991, Martin and Smith 1993, Myers 1990, Myers and Ewel 1990, Peet and Allard 1993, Pessin 1933, Schafale 1994, Schafale and Weakley 1990, Smith 1996a, Soil Conservation Service 1990, Turner et al. 1999, Wentworth et al. 1993

II.A.4.N.A. *PINUS PALUSTRIS* WOODLAND ALLIANCE (A.520) LONGLEAF PINE WOODLAND ALLIANCE

ALLIANCE CONCEPT

Summary: This alliance includes mesic to dry-mesic upland *Pinus palustris* woodlands and savannas, on rolling hills or on flats, with an open to sparse canopy of *Pinus palustris*, and lacking scrub oaks and the extreme xeric conditions that typically support these species. If oaks are present, they are generally of more mesic species, such as *Quercus falcata*, *Quercus nigra*, *Quercus virginiana*, or *Quercus pumila*; examples may contain more xeric species such as *Quercus marilandica* or *Quercus stellata*, in combination with the more mesic oaks. Other pines, particularly *Pinus echinata*, *Pinus elliottii* var. *elliottii*, and *Pinus taeda*, may be present. While not dominant, they may form part of the canopy, increasing with fire suppression. When fire-suppressed, *Quercus falcata*, *Liquidambar styraciflua*, *Acer rubrum*, *Quercus nigra*, *Nyssa sylvatica*, *Cornus florida*, *Callicarpa americana*, and/or *Rhus copallinum* may invade or increase. Overall floristic composition is primarily composed of upland species typical of mesic to dry-mesic conditions, but may include an admixture of species characteristic of wetland sites and those characteristic of xeric sites as well. Some typical mesic to dry-mesic herbaceous species include *Andropogon ternarius*, *Andropogon gyrans* var. *gyrans*, *Schizachyrium scoparium*, *Sorghastrum nutans*, and *Panicum virgatum*. *Aristida stricta* or *Aristida beyrichiana* are also dominant or at least present in the herbaceous layer of many associations within their respective ranges. Variation in floristic composition of this wide-ranging alliance is related to site conditions, fire interval, and local or regional floristics. The herbaceous layer typically becomes much less diverse with increased fire interval. This alliance typically occurs on finer-textured soils, such as clays and clay loams.

Related Concepts:

- IB6i. Atlantic Coastal Plain Mesic Longleaf Pine Forest (Allard 1990) ?
- IB6k. West Gulf Coastal Plain Upland Longleaf Pine Forest (Allard 1990) I
- IB6l. East Gulf Coastal Plain Upland Longleaf Pine Forest (Allard 1990) I
- Loamy Hills Longleaf - Slash Pine Forest (Wieland 1994b) ?
- Longleaf Pine - Mixed Hardwood Woodland (Moore pers. comm.) ?
- Longleaf Pine - Scrub Oak: 71 (Eyre 1980) I
- Longleaf Pine-Little Bluestem Series (Diamond 1993) I
- Longleaf Pine: 70 (Eyre 1980) I
- Mesic Pine Flatwoods (Schafale and Weakley 1990) I
- Mesic Pine Flatwoods, Coastal Plain Variant (Schafale 1994) ?
- Mesic Pine Flatwoods, Little River Variant (Schafale 1994) ?
- Mesic Pine Flatwoods, Sandhills Variant (Schafale 1994) ?
- Southern Mesic Longleaf Pine Woodland (Peet and Allard 1993) ?
- Western Upland Longleaf Pine Forest (Smith 1996a) I

Classification Comments: This alliance includes a variety of associations characterized by the presence of *Pinus palustris* occurring on a variety of mesic to dry-mesic substrates, most commonly on loamy and clayey soils in the Atlantic and Gulf coastal plains. It is differentiated from the *Pinus palustris* / *Quercus* spp. Woodland Alliance (A.499) by the dearth of xeric oaks (*Quercus laevis*, *Quercus incana*, *Quercus margarettiae*) and its occurrence in the Coastal Plain in mesic to dry-mesic situations on finer-textured soils. There is some floristic overlap between these two alliances and therefore substrate and physiographic differences help to differentiate them. This alliance includes a variety of associations previously placed in related other alliances which have now been merged with this one. These related alliances include the former I.C.3.N.a *Pinus palustris* - *Pinus (echinata, taeda)* - *Quercus (incana, margarettiae, falcata, laevis)* Forest Alliance (A.397) and former II.A.4.N.a *Pinus palustris* - *Pinus (echinata, taeda)* Woodland Alliance (A.519). Some of these associations, because of their inland geography and/or a history of disturbance and/or fire suppression, contain other pine species (*Pinus echinata* and/or *Pinus taeda*) or oaks in their canopies. Depending on fire interval, the canopy closure may temporarily exceed 60%. Despite this, all are now placed here. Some examples of this condition include fire-suppressed or otherwise ecologically disturbed longleaf pine woodlands from the coastal plains with tall and dense oaks that enter the canopy, or mixed pine woodlands within the natural range of *Pinus palustris* and at least partially dominated by it. The pine canopy component is sometimes a mixture of pine species; this usually arises from ingrowth of the less fire-tolerant pines (*Pinus echinata*, *Pinus taeda*) into natural, planted, or managed stands of *Pinus palustris*. Oaks present may include *Quercus stellata*, *Quercus falcata*, *Quercus marilandica*, *Quercus alba*, *Quercus nigra*, *Quercus hemisphaerica*, and *Quercus prinus*, which will frequently be present in the understory or also scattered in the overstory, depending on the moisture regime. *Oxydendrum arboreum* is commonly present, and *Liquidambar styraciflua*, *Carya alba*, *Carya pallida*, *Diospyros virginiana*, *Nyssa sylvatica*, and *Cornus florida* could be as well. The woodland structure may be wholly 'natural,' or it may have been created and maintained by silvicultural techniques designed to replicate this natural condition. At many sites, both forest and woodland communities may be present, grading into one another depending on aspect, surface geology, or fire history. This alliance also includes silviculturally managed forests of planted or seed tree/shelterwood-regenerated *Pinus palustris* with *Pinus echinata* and/or *Pinus taeda* invading due to fire suppression.

ALLIANCE DISTRIBUTION

Range: This alliance is found in Alabama, Florida, Georgia, Louisiana, Mississippi, North Carolina, South Carolina, Texas, and Virginia.

Subnations: AL, FL, GA, LA, MS, NC, SC, TX

TNC Ecoregions: 31:C, 40:C, 41:C, 43:C, 53:C, 55:C, 56:C, 57:C

USFS Ecoregions: 231Ac:CCC, 231Bd:CCC, 231Bj:CCP, 231Dd:CCC, 231Ea:CCC, 231Ef:CCC, 231Eg:CCP, 231Eh:CCC, 231Fa:CPP, 232Ba:CCC, 232Bb:CCC, 232Bc:CCP, 232Be:CCP, 232Bf:CCC, 232Bg:CCC, 232Bh:CCC, 232Bj:CCC, 232Bk:CCC, 232Bl:CCP, 232Bm:CCP, 232Bn:CCP, 232Bo:CCP, 232Bp:CCP, 232Bq:CCC, 232Br:CCC, 232Bs:CCC, 232Bu:CCP, 232Bv:CCC, 232Ca:CCC, 232Cb:CCC, 232Cc:CCP, 232Ce:CCC, 232Cf:CCC, 232Da:CCP, 232Db:CCC, 232Dc:CCC, 232Ea:CCC, 232Eb:CCP, 232Fa:CCC, 232Fb:CCC, 232Fe:CCC, 232Ga:CPP, 232Gb:CPP, 232Gc:CPP

Federal Lands: DOD (Camp Lejeune, Eglin, Fort Benning, Fort Bragg, Fort Gordon, Fort McClellan, Fort Stewart, Sunny Point); NPS (Congaree Swamp); USFS (Angelina, Apalachicola, Bienville, Conecuh, Croatan, Daniel Boone, Davy Crockett, De Soto, Francis Marion, Homochitto, Kisatchie, Ocala, Osceola, Sabine NF, Sam Houston, Talladega, Tuskegee, Uwharrie); USFWS (Bon Secour, Okefenokee)

ALLIANCE SOURCES

References: Allard 1990, Bridges and Orzell 1989a, Burk 1959, Diamond 1993, Eyre 1980, Frost 1993, Martin and Smith 1991, Moore pers. comm., Myers 1990, Peet and Allard 1993, Pessin 1933, Schafale 1994, Schafale and Weakley 1990, Smith 1996a, Weaver 1969, Wharton 1978, Wieland 1994b

II.A.4.N.f. Saturated temperate or subpolar needle-leaved evergreen woodland

II.A.4.N.F. *PINUS PALUSTRIS* - *PINUS (ELLIOTTII, SEROTINA)* SATURATED WOODLAND ALLIANCE (A.578)

LONGLEAF PINE - (SLASH PINE, POND PINE) SATURATED WOODLAND ALLIANCE

ALLIANCE CONCEPT

Summary: This alliance consists of wet pinelands (often termed pine flatwoods, wet pine flatwoods, and pine savannas) of the Outer Coastal Plain or 'coastal flatlands' typically dominated by *Pinus palustris*, with or without the presence of the other nominals. *Pinus elliottii* var. *elliottii* and *Pinus serotina* are more restricted geographically and edaphically than is *Pinus palustris*. *Pinus serotina* may be present within its natural range (from southeastern Virginia south to panhandle Florida) but tends to be codominant only on the wettest, often organic soils. *Pinus elliottii* var. *elliottii* may be present or codominant within its natural range from South Carolina to eastern Louisiana, as well as in limited areas of the West Gulf Coastal Plain (which are outside the natural range of *Pinus elliottii* var. *elliottii*). Both *Pinus elliottii* and *Pinus serotina* may replace *Pinus palustris* on wetter sites. Both species are less tolerant of frequent fire than is *Pinus palustris*. While *Pinus elliottii* can survive reasonably frequent fire, it has been estimated that natural fire frequencies are less than half that of longleaf pine, while typical regimes for *Pinus serotina* may be less than one-third as frequent. Thus, it is often believed that these species were confined historically to wetter flatwoods sites with lower burn frequencies than those typical of *Pinus palustris*-dominated communities. With fire suppression, alteration of fire regimes, and widespread logging of *Pinus*

palustris, *Pinus elliottii* has invaded many flatwoods sites historically dominated almost exclusively by *Pinus palustris*. To a lesser extent this phenomenon may also have occurred with *Pinus serotina*. As presently defined, this alliance includes both naturally mixed *Pinus palustris* - *Pinus elliottii* stands, as well as those originally dominated by *Pinus palustris* into which *Pinus elliottii* has invaded, as well as silviculturally managed stands outside of the natural range of *Pinus elliottii* var. *elliottii* in Louisiana and Texas. Across the range of this alliance, pine densities vary from low with widely spaced trees giving an open savanna-like aspect, to high with dense, nearly closed canopies. Nevertheless, even the densest stands have discontinuous canopies which allow considerable light to penetrate to the forest floor. Probably the most significant factor affecting community composition is fire. In fire suppressed examples, an understory of *Acer rubrum*, *Liquidambar styraciflua*, and *Morella cerifera* (= *Myrica cerifera*) is likely to develop. Understory composition is variable, and includes both shrub- and shrub/graminoid-dominated systems. Heavily shrubby examples may be indicative of lower fire frequencies than are more herbaceous-dominated examples. Appreciable herb layers typically exist only where the canopy and shrub layers are relatively open, and where there has been relatively frequent fire history. Grasses usually make up the majority of total cover. This alliance also includes silviculturally managed stands from the West Gulf Coastal Plain of Louisiana and Texas.

Related Concepts:

- IIB1b. Wet Longleaf Pine Flatwoods (Allard 1990) ?
- IIB1c. Wet Longleaf Pine - Slash Pine Flatwoods (Allard 1990) ?
- IIB1d. Atlantic Coastal Plain Wet Longleaf Pine Savanna (Allard 1990) ?
- IIB1g. Atlantic Coastal Plain Wet-Mesic Longleaf Pine Savanna (Allard 1990) ?
- IIB1h. East Gulf Coastal Plain Wet Longleaf Pine Savanna (Allard 1990) I
- IIB1i. West Gulf Coastal Plain Wet Longleaf Pine Savanna (Allard 1990) I
- Longleaf Pine - Slash Pine: 83 (Eyre 1980) ?
- Longleaf Pine / *Schizachyrium* - *Drosera* Fine-Sandy Wet Flatwoods (Turner et al. 1999) I
- Longleaf Pine-Beakrush Series (Diamond 1993) I
- Longleaf Pine: 70 (Eyre 1980) I
- Mesic Flatwoods (FNAI 1992a) I
- Piedmont Longleaf Pine Forest, Wet Variant (Schafale 1994) ?
- Pine Savanna (Schafale and Weakley 1990) I
- Pine Savanna, Lumbee Variant (Schafale 1994) ?
- Pine Savanna, Very Wet Clay Variant (Schafale 1994) ?
- Pine Savanna, Wet Spodosol Variant (Schafale 1994) ?
- Pine Savanna, Wet Ultisol Variant (Schafale 1994) ?
- Pond Pine: 98 (Eyre 1980) I
- Western Wet/Mesic Longleaf Pine Savannah/Flatwoods (Smith 1996a) I
- Western Wet/Mesic Longleaf Pine Savannah/Flatwoods, saline variant (Smith 1996a) ?
- Wet Pine Flatwoods (Schafale and Weakley 1990) I
- Wet Pine Flatwoods, Leiophyllum Variant (Schafale 1994) ?
- Wet Pine Flatwoods, Wet Spodosol Variant (Schafale 1994) ?
- Wet Slash Pine Savannah (Wieland 1994b) ?

Classification Comments: More information needs to be integrated on the expression of vegetation of this alliance in Texas (e.g., in the Big Thicket); existing associations as of November 2000 may not be entirely adequate, although one is positively attributed to Texas (MP 2000-12-04). REE 2000-12-01: "the so called wet savannas or flatwoods which may or may not have pitcher plants present are crudely covered by associations. These are the ones which basically come from LA and haven't been worked up enough to specifically incorporate examples in TX . The types from the WGCP were all defined by Latimore Smith from LA examples; their occurrence and distribution are poorly understood west of the Sabine River." There are some stands at Fort Benning, Georgia, which contain *Pinus serotina* with *Pinus palustris* over either *Arundinaria gigantea* or a mix of other evergreen shrubs. This is near the northern limit of the distribution of *Pinus serotina*, and these stands have been placed either as *Arundinaria gigantea* Saturated Shrubland Alliance (A.801) or *Lyonia lucida* - *Ilex glabra* Saturated Wooded Shrubland Alliance (A.805) with scattered, stunted *Pinus serotina*.

ALLIANCE DISTRIBUTION

Range: This alliance is found in Alabama, Florida, Georgia, Louisiana, Mississippi, North Carolina, South Carolina, Texas, and Virginia.

Subnations: AL, FL, GA, LA, MS, NC, SC, TX, VA

TNC Ecoregions: 41:C, 43:?, 52:C, 53:C, 55:C, 56:C, 57:C

USFS Ecoregions: 231Ao:CCC, 231Bd:C??, 232Ba:CCC, 232Be:CCC, 232Bf:CCC, 232Bg:CCC, 232Bh:CCC, 232Bi:CCC, 232Bj:CCC, 232Bp:CCP, 232Bq:CCC, 232Br:CCC, 232Bv:CCC, 232Ca:CCC, 232Cb:CCC, 232Cc:CCC, 232Cd:CCC, 232Ce:CCC, 232Cf:CCC, 232Ch:CCC, 232Db:CCC, 232Dc:CCC, 232Dd:CCC, 232Ea:CCP, 232Fa:CCC, 232Fb:CCC, 232Fe:CCP, 232Ga:CCC, 232Gc:CCC, 232Gd:CCP

Federal Lands: DOD (Avon Park, Camp Lejeune, Eglin, Fort Benning, Fort Bragg, Fort Jackson, Fort Stewart); NPS (Big Thicket); USFS (Angelina, Apalachicola, Conecuh, Croatan, De Soto, Francis Marion, Kisatchie, Ocala, Osceola, Uwharrie); USFWS (Carolina Sandhills, Grand Bay, Mississippi Sandhill Crane, Pee Dee)

ALLIANCE SOURCES

References: Abrahamson and Hartnett 1990, Allard 1990, Bridges and Orzell 1989a, Christensen 1979, Clewell 1981, Diamond 1993, Eyre 1980, FNAI 1992a, FNAI 1992b, Frost 1993, Frost et al. 1986, Kologiski 1977, Martin and Smith 1991, Martin and Smith 1993, Peet and Allard 1993, Pessin 1933, Schafale 1994, Schafale and Weakley 1990, Smith 1996a, Turner et al. 1999, Walker and Peet 1983, Wharton 1978, Wieland 1994b, Woodwell 1956

II.A.4.N.F. *PINUS SEROTINA* SATURATED WOODLAND ALLIANCE (A.581) POND PINE SATURATED WOODLAND ALLIANCE

ALLIANCE CONCEPT

Summary: Saturated woodlands dominated by *Pinus serotina*, often termed pocosins or pond pine woodlands. Soils are generally peats or organic-rich coarse sands. The canopy coverage of individual stands tends to vary in space and time from sparse woodland (less than 25% canopy cover), through woodland (25-60% canopy cover), to forest (more than 60% canopy cover). The average expression of most of these communities (under a 'normal' fire regime) is that of a woodland. Shrub densities can also be highly variable, with cover from 100% to less than 50%. Some common and typical shrubs (variable from association to association) include *Photinia pyrifolia* (= *Aronia arbutifolia*), *Clethra alnifolia*, *Cyrilla racemiflora*, *Gaylussacia frondosa* (= var. *frondosa*), *Ilex coriacea*, *Ilex glabra*, *Kalmia carolina*, *Kalmia cuneata*, *Leucothoe racemosa*, *Lyonia ligustrina* var. *foliosiflora*, *Lyonia lucida*, *Morella cerifera* (= *Myrica cerifera* var. *cerifera*), *Morella caroliniensis* (= *Myrica heterophylla*), *Persea palustris*, *Smilax laurifolia*, *Toxicodendron vernix*, *Vaccinium formosum*, and *Viburnum nudum* var. *nudum*. The bay species, *Gordonia lasianthus*, *Persea palustris*, and *Magnolia virginiana*, are present in most examples, and *Gordonia lasianthus* is a codominant canopy species in some associations. This alliance can cover very large areas in Outer Coastal Plain peat domes and large peat-filled Carolina bays of southeastern Virginia, eastern North Carolina, and northeastern South Carolina, where it forms the landscape matrix in unbroken blocks of up to 100 square miles. In other landscapes, such as the Fall-line Sandhills of North Carolina, South Carolina, and Georgia, it occurs as relatively narrow bands along streams.

Related Concepts:

- Coastal Plain Bog/Seep Forest (Ambrose 1990a) I
- IIB2b. Pond Pine Woodland (Allard 1990) ?
- IIC1b. High Pocosin (Allard 1990) I
- Pond Pine Woodland (Nelson 1986) ?
- Pond Pine Woodland (Schafale and Weakley 1990) I
- Pond Pine: 98 (Eyre 1980) I
- Small Depression Pocosin (Schafale and Weakley 1990) ?
- Streamhead Pocosin (Schafale and Weakley 1990) ?
- Wet Flatwoods (FNAI 1992a) I

Classification Comments: None

ALLIANCE DISTRIBUTION

Range: This alliance can cover very large areas in outer coastal plain peat domes and large peat-filled Carolina bays of southeastern Virginia, eastern North Carolina, and northeastern South Carolina, where it forms the landscape matrix in unbroken blocks of up to 100 square miles. In other landscapes, such as the Fall-line Sandhills of North Carolina, South Carolina, and Georgia, and the Lake Wales Ridge in Florida, it occurs as relatively narrow bands along streams.

Subnations: AL, FL, GA, NC, SC, VA

TNC Ecoregions: 53:C, 55:C, 56:C, 57:C

USFS Ecoregions: 232Be:CCP, 232Bf:CCC, 232Bq:CCC, 232Br:CC?, 232Bv:CCC, 232Ca:CCP, 232Cb:CCC, 232Cc:CCP, 232Cd:CCP, 232Ce:CCC, 232Ch:CCC, 232Dc:CCC, 232Ga:C??

Federal Lands: DOD (Camp Blanding, Camp Lejeune, Dare County Bombing Range, Eglin, Fort Bragg); USFS (Apalachicola, Croatan, Francis Marion, Ocala, Osceola); USFWS (Alligator River, Carolina Sandhills, Cedar Island, Great Dismal Swamp, Pocosin Lakes, St. Marks?)

ALLIANCE SOURCES

References: Allard 1990, Ambrose 1990a, Christensen et al. 1981, Clewell 1981, Eyre 1980, FNAI 1992a, FNAI 1992b, Fleming 1998, Kologiski 1977, Nelson 1986, Schafale and Weakley 1990, Sharitz and Gibbons 1982

II.B.2.N.a. Cold-deciduous woodland

II.B.2.N.A. *QUERCUS LAEVIS* WOODLAND ALLIANCE (A.617) TURKEY OAK WOODLAND ALLIANCE

ALLIANCE CONCEPT

Summary: These communities, strongly dominated by *Quercus laevis*, are mostly (or possibly entirely) the result of the removal and reproductive failure of *Pinus palustris*. This includes modified and/or fire-suppressed examples of *Pinus palustris* - *Quercus* spp.-dominated vegetation, where *Pinus palustris* has been removed and/or failed to regenerate due to fire suppression or other environmental modifications, including turpentine logging and logging. Canopy closure of fire-suppressed examples may exceed 60%. The relative density and diversity of the shrub and herb layers will vary with degree of fire suppression; the local expression will vary with latitude and the distributions of various shrub and herbaceous components, as well as with soil texture. For conservation and restoration purposes, these communities should be considered as lower quality (but often highly restorable) examples of various communities in II.A.4.N.a *Pinus palustris* / *Quercus* spp. Woodland Alliance (A.499). This alliance includes vegetation with an open to somewhat dense canopy and understory of *Quercus laevis*, with other dry-habitat oak species such as *Quercus margarettiae*, *Quercus marilandica*, and *Quercus incana*. The canopy may include other hardwoods, such as *Carya floridana*, *Sassafras albidum*, and *Diospyros virginiana*. In Florida, *Quercus incana* may be codominant with *Quercus laevis*, but it declines more rapidly with prolonged fire suppression. The density of other strata will depend on site conditions and fire-return interval. Under conditions of extreme fire suppression, the structure may approach that of a forest (i.e., greater than 60% canopy closure). A low-shrub layer may contain such species as *Gaylussacia dumosa* and *Toxicodendron pubescens*. Herbs which may be present include *Aristida stricta*, *Aristida beyrichiana*, *Aristida lanosa*, *Cnidioscolus stimulosus*, *Licania michauxii*, *Opuntia humifusa* (= *Opuntia compressa*), *Pityopsis graminifolia*, *Pteridium aquilinum*, *Schizachyrium scoparium*, *Andropogon virginicus*, and *Tephrosia virginiana*. Some xeric Florida sandhills are very species-rich. The herb layer frequently includes fruticose lichens such as *Cladonia* spp. and *Cladina* spp. In some more fire-suppressed examples, herbs may be limited and sparse and may include *Andropogon virginicus* and/or *Schizachyrium scoparium*. Although Turkey Oak Woodlands might have occurred naturally in presettlement times, they were probably transitory and of small extent, and are best considered as localized inclusions of lower pine density in *Pinus palustris* sandhills. In any case, their prevalence has greatly increased with removal of *Pinus palustris* and subsequent fire suppression. The alliance occurs primarily on sandy ridges or high dunes; it is best developed and most prevalent in the central peninsula of Florida and the Sandhills of the Carolinas. Soils of these sites are most frequently strongly acid Entisols, lacking substantial clay and organic matter in the soil (including some deep sands). Some examples with higher canopy closure (some formerly classed as forest associations) include fire-suppressed *Quercus laevis* forests in the Inner Coastal Plain of South Carolina; sandhills over clays or sands with clay lenses where *Pinus palustris* was removed or failed to regenerate; various other fire-suppressed oak forests following removal of *Pinus palustris*; as well as depauperate longleaf pine sandhill communities at the northern limit of the range of *Aristida stricta* and other *Pinus palustris* associates. In the central sand ridges of Florida, this vegetation occurs in association with scrub communities, partly the result of logging and fire suppression.

Related Concepts:

- Coastal Plain Sandhill Scrub/Scrub-lichen Forest (Ambrose 1990a) ?
- IB7a. Southeastern Coastal Plain Turkey Oak Barrens (Allard 1990) ?
- Sandhills, Turkey Oak Phase (Monk 1968) ?
- Scrub (FNAI 1992a) I
- Southern Scrub Oak: 72 (Eyre 1980) I
- Xeric Sandhill Scrub (Nelson 1986) I
- Xeric Sandhill Scrub (Schafale and Weakley 1990) I

Classification Comments: In Florida, this vegetation now occupies substantially more acreage than high-quality scrub communities, but its extent is now decreasing because of conversion to *Citrus* plantations or loss through urbanization and development. Only very small occurrences exist in Louisiana and Virginia. A variety of forest and woodland associations have been combined into one general type, due to the modified and altered nature of this vegetation. On Fort Benning, Georgia, a type of modified vegetation placed in this alliance, *Crataegus flava* - *Quercus (incana, laevis)* Woodland (CEGL007883), results from lack of *Pinus palustris* regeneration and is common in buffer zones surrounding live fire ranges in areas that burn yearly (V. Emrick pers. comm. 1998).

ALLIANCE DISTRIBUTION

Range: This alliance is found in Alabama, Florida, Georgia, Louisiana, Mississippi, North Carolina, South Carolina, and Virginia.

Subnations: AL, FL, GA, LA, MS, NC, SC, VA

TNC Ecoregions: 43:C, 53:C, 55:C, 56:C, 57:C

USFS Ecoregions: 231Bd:PPP, 232Bf:CCC, 232Bh:CCC, 232Bi:CC?, 232Bj:CCP, 232Bq:CCC, 232Br:CCC, 232Ca:CCP, 232Cb:CCC, 232Ce:CCC, 232Ch:CCC, 232Dc:CCC, 232Dd:CCC, 232Ga:CPP, 232Gb:CPP

Federal Lands: DOD (Fort Benning, Fort Bragg, Fort Gordon, Fort Stewart); DOE (Savannah River Site); USFS (Apalachicola, Conecuh, Croatan, De Soto, Francis Marion, Homochitto?, Ocala, Talladega, Tuskegee); USFWS (Carolina Sandhills)

ALLIANCE SOURCES

References: Abrahamson et al. 1984, Allard 1990, Ambrose 1990a, Burns and Honkala 1990b, Emrick pers. comm., Eyre 1980, FNAI 1992a, Jones et al. 1981a, Monk 1968, Myers 1990, Nelson 1986, Rebertus et al. 1989, Schafale and Weakley 1990, Weaver 1969, Wharton 1978, Workman 1982

II.B.2.N.c. Seasonally flooded cold-deciduous woodland

II.B.2.N.C. *TAXODIUM ASCENDENS* SEASONALLY FLOODED WOODLAND ALLIANCE (A.651) POND-CYPRESS SEASONALLY FLOODED WOODLAND ALLIANCE

ALLIANCE CONCEPT

Summary: This alliance consists of pond-cypress woodlands and savannas that flood for most of the winter and generally dry down to a water level below the soil surface by late summer. These sites are found in relatively flat basins where woodland structure is favored; deeper ponds tend to have closed canopies. The canopy of *Taxodium ascendens* is open to scattered. Some examples will have a dense shrub layer dominated by species such as *Zenobia pulverulenta*, *Vaccinium fuscatum*, *Vaccinium formosum*, *Cyrilla racemiflora*, and *Ilex amelanchier*, while others will have little to no shrub layer. The herbaceous layer can be dense and species-rich. *Panicum hemitomon* and/or *Rhynchospora* spp. are often dominant; *Polygala cymosa*, *Rhexia aristosa*, *Lobelia boykinii*, *Sagittaria* spp., *Lachnanthes carolina*, *Panicum tenerum*, *Rhynchospora microcarpa*, *Rhynchospora tracyi*, *Rhynchospora* spp., *Woodwardia virginica*, and other species may be present. Woodlands in this alliance most often occur in clay-based Carolina bays and other seasonally flooded wetlands.

Related Concepts:

- Cypress Forests (Gunderson and Loftus 1993) ?
- Cypress Prairie (Gunderson and Loftus 1993) ?
- Cypress Savanna (Schafale and Weakley 1990) ?
- Dwarf Cypress (Gunderson and Loftus 1993) ?
- Hatrack Cypress (Gunderson and Loftus 1993) ?
- IIB2a. Pond Cypress Savanna (Allard 1990) ?
- Open-canopy ("Hatrack") Cypress Forest (Hilsenbeck et al. 1979) ?
- Pond Cypress Savannah (Nelson 1986) ?
- Pondcypress: 100 (Eyre 1980) I

Classification Comments: None

ALLIANCE DISTRIBUTION

Range: Woodlands in this alliance are distributed in the Coastal Plain of Georgia, South Carolina, and North Carolina, as well as in the East Gulf Coastal Plain of Alabama, Florida, and Mississippi. They extend southwards into subtropical Florida.

Subnations: AL, FL, GA, MS, NC, SC

TNC Ecoregions: 53:C, 54:C, 55:C, 56:C, 57:C

USFS Ecoregions: 232Be:CCP, 232Bg:CCP, 232Bq:CCP, 232Bv:CCC, 232Cb:CCC, 232Ce:CCC, 232Dc:CCC, 411Ab:CC?, 411Af:CCC

Federal Lands: NPS (Big Cypress, Everglades); USFS (Apalachicola, Francis Marion)

ALLIANCE SOURCES

References: Allard 1990, Bennett and Nelson 1991, Eyre 1980, Folkerts 1997, Gunderson and Loftus 1993, Hilsenbeck et al. 1979, Huck 1987, Nelson 1986, Olmsted et al. 1980b, Schafale and Weakley 1990, Wharton 1978

III. Shrubland

III.A.2.N.i. Saturated temperate broad-leaved evergreen shrubland

III.A.2.N.I. *CYRILLA RACEMIFLORA* - *ILEX CORIACEA* - (*CLIFTONIA MONOPHYLLA*)

SATURATED SHRUBLAND ALLIANCE (A.802)

TITI - BIG GALLBERRY - (BLACK TITI) SATURATED SHRUBLAND ALLIANCE

ALLIANCE CONCEPT

Summary: This alliance consists of evergreen shrublands of the southeastern Coastal Plain (Atlantic Coastal Plain, East and West Gulf coastal plains, and occasionally adjacent provinces). *Cyrilla racemiflora*, *Ilex coriacea*, and *Cliftonia monophylla* (within its range) are characteristic. Other characteristic shrubs (although some are absent in portions of the alliance's distribution) include *Ilex glabra*, *Ilex myrtifolia*, *Lindera subcoriacea*, *Lyonia lucida*, *Morella cerifera* (= *Myrica cerifera*), *Morella caroliniensis* (= *Myrica heterophylla*), *Morella inodora* (= *Myrica inodora*), *Persea palustris*, *Smilax laurifolia*, *Alnus serrulata*, *Toxicodendron vernix*, and *Vaccinium formosum*. In some situations, stunted *Magnolia virginiana* may be a component; emergent *Pinus elliottii* var. *elliottii* and/or *Taxodium ascendens* may be present. Communities in this alliance occur in poorly drained flats in the Outer Coastal Plain, along lake- or pondshores, where the water table is maintained in at least a seasonally saturated condition by the water body, and in seepages in rolling hill landscapes of the Coastal Plain (often associated with and adjacent to herbaceous seepage bogs). Some types occur over peats or other sapric soil types. Occurrences expand or contract in size under different fire regimes.

Related Concepts:

- Bog (FNAI 1992a) I
- Carolina bay/Okefenokee swamp shrub/scrub vegetation (Ambrose 1990a) ?

- High Pocosin (Wieland 1994b) ?
- Low Pocosin (Wieland 1994b) ?
- Natural Lake Shoreline (Schafale and Weakley 1990) I
- Scrub/Shrub Swamp (Smith 1996a) I Seepage Slope (FNAI 1992a) I
- Seepage Slope Shrub Thicket (Smith 1996a) I
- Seepage Slope, *Pinckneya* Bog subtype (FNAI 1992b) ?
- Shrub Bog (Wharton 1978) I
- Sweetbay - Swamp Tupelo / *Osmunda* Loamy Wet Forested Seeps (Turner et al. 1999) I

Classification Comments: None

ALLIANCE DISTRIBUTION

Range: This alliance consists of evergreen shrublands of the southeastern coastal plain (Atlantic Coastal Plain, East and West Gulf coastal plains, and occasionally adjacent provinces). It is found in Alabama, Florida, Georgia, Louisiana, Mississippi, North Carolina, South Carolina, and Texas.

Subnations: AL, FL, GA, LA, MS, NC, SC, TX

TNC Ecoregions: 40:C, 41:C, 53:C, 55:P, 56:C, 57:C

USFS Ecoregions: 231Ea:CCC, 231Ef:CC?, 231Eg:CCC, 231Eh:CCC, 231Ei:CC?, 232Ba:CCC, 232Be:CCP, 232Bg:CCC, 232Bh:CCP, 232Bi:CCP, 232Bj:CCC, 232Bk:CCP, 232Bm:CCP, 232Bn:CCP, 232Bo:CCP, 232Bp:CCP, 232Bq:CCC, 232Br:CCC, 232Bu:CCP, 232Bv:CCC, 232Ca:CCC, 232Cb:CCC, 232Cc:CCC, 232Cd:CCC, 232Ce:CCC, 232Cf:CCP, 232Ch:CCC, 232Dc:CCC, 232Ea:CP?, 232Eb:CP?, 232Fa:CCC, 232Fb:CCC, 232Fe:CCC

Federal Lands: DOD (Eglin, Fort Benning, Fort Gordon, Fort Stewart); USFS (Angelina, Apalachicola, Conecuh, Croatan, De Soto, Francis Marion, Kisatchie, Sabine NF, Sam Houston?); USFWS (Okefenokee)

ALLIANCE SOURCES

References: Ambrose 1990a, FNAI 1992a, FNAI 1992b, Schafale and Weakley 1990, Smith 1996a, Turner et al. 1999, Wharton 1978, Wieland 1994b

III.A.2.N.j. Saturated temperate broad-leaved evergreen shrubland with a sparse needle-leaved or mixed evergreen tree layer

III.A.2.N.J. ARUNDINARIA GIGANTEA SATURATED WOODDED SHRUBLAND ALLIANCE (A.804) GIANT CANE SATURATED WOODDED SHRUBLAND ALLIANCE

ALLIANCE CONCEPT

Summary: This alliance includes dense stands of *Arundinaria gigantea* ssp. *tracta* with scattered *Pinus serotina* and sometimes with some *Nyssa biflora* or *Liriodendron tulipifera*. Physiognomy and structure vary with fire-return interval. In areas that burn every 3-5 years, the appearance of the vegetation will be that of nearly pure *Arundinaria gigantea*, perhaps with scattered *Pinus serotina*. Cover of pocosin shrubs (e.g., *Ilex glabra*, *Ilex coriacea*, *Lyonia lucida*, *Lyonia ligustrina* var. *foliosiflora*, *Cyrilla racemiflora*, *Zenobia pulverulenta*, *Magnolia virginiana*, *Photinia pyrifolia* (= *Aronia arbutifolia*)) and *Acer rubrum* var. *trilobum* increase with lack of fire, and with fire suppression greater than 15 years, these species will overtake the cane. This alliance occurs on shallow organic soils (10-100 cm deep), in areas which burn every 3-12 years. Typically it is found around the periphery of deep peat deposits where peat feathers out onto mineral soil, in peat-filled depressions and sloughs in pine barrens, or on upland flats where drainage is poor enough to permit accumulation of an organic layer deep enough to support the cane rhizome mat. It is likely that the soil is saturated throughout most of the winter and spring, and probably dries out in the summer and fall. Organic matter depth, fire frequency, and nutrient availability are the primary factors controlling vegetation structure and composition in this vegetation. This alliance is thought to have been common in presettlement times, existing as large, open tracts. Most of the presettlement acreage has succeeded to pocosin vegetation because of fire exclusion or has been drained and cleared for agriculture.

Related Concepts:

- IIB2c. Peatland Canebrake (Allard 1990) ?
- Pond Pine Woodland (Schafale and Weakley 1990) I
- Pond Pine: 98 (Eyre 1980) I

Classification Comments: None

ALLIANCE DISTRIBUTION

Range: This alliance is found in North Carolina, Virginia, and South Carolina.

Subnations: NC, SC, VA

TNC Ecoregions: 56:?, 57:C, 58:P

USFS Ecoregions: 232Ch:CP?

Federal Lands: DOD (Fort Bragg); USFS (Croatan?, Francis Marion)

ALLIANCE SOURCES

References: Allard 1990, Eyre 1980, Frost 1989, Heineke 1987, Hughes 1966, Meanley 1972, Schafale and Weakley 1990

III.A.2.N.J. LYONIA LUCIDA - ILEX GLABRA SATURATED WOODED SHRUBLAND ALLIANCE (A.805)
SHINING FETTERBUSH - LITTLE GALLBERRY SATURATED WOODED SHRUBLAND ALLIANCE

ALLIANCE CONCEPT

Summary: This alliance encompasses pocosins on saturated mineral or organic soils. This is the typical high pocosin or tall pocosin of peatlands and wet mineral soils of the Coastal Plain of the Carolinas and Virginia; its range extends south to Georgia and northern Florida. *Pinus serotina* individuals are scattered and more-or-less stunted. Typical shrubs, forming a dense tangle with abundant *Smilax laurifolia*, are *Lyonia lucida*, *Ilex glabra*, *Ilex coriacea*, *Persea palustris*, *Cyrilla racemiflora* (absent in occurrences at the northern limit of the range in southeastern Virginia), and sometimes *Kalmia carolina*. Other component shrubs can include *Clethra alnifolia*, *Vaccinium formosum*, *Gaylussacia frondosa* (= var. *frondosa*), *Kalmia cuneata*, *Photinia pyrifolia* (= *Aronia arbutifolia*), *Chamaecyparis thyoides*, *Acer rubrum* var. *trilobum*, *Morella cerifera* (= *Myrica cerifera* var. *cerifera*), *Lyonia ligustrina* var. *foliosiflora*, *Magnolia virginiana*, *Rhus copallinum*, *Rhododendron viscosum*, and *Toxicodendron radicans*.

Related Concepts:

- High Pocosin (Schafale and Weakley 1990) I
- IIC1b. High Pocosin (Allard 1990) I

Classification Comments: Some stands from the Fall-line Sandhills of Fort Benning, Georgia (East Gulf Coastal Plain), at or near the local northernmost edge of the distribution of *Pinus serotina* are placed here. The polygons that have been referred here (A.805) have dense evergreen shrubs (mostly *Ilex glabra* and *Ilex coriacea*) with some *Arundinaria gigantea*. They also have dense *Smilax* spp. (M. Mulligan pers. comm. 2001). More information is needed on these stands in order to determine if they are placed correctly in this alliance, and if they warrant a separate association (MP 2001-04-12).

ALLIANCE DISTRIBUTION

Range: This alliance is found in the Coastal Plain of Florida, Georgia, North Carolina, South Carolina, and Virginia.

Subnations: FL, GA, NC, SC, VA

TNC Ecoregions: 53:C, 56:C, 57:C

USFS Ecoregions: 232Br:CCP, 232Ca:CCC, 232Cb:CCC, 232Cc:CCP, 232Cd:CCC, 232Cf:CCP, 232Ch:CCC, 232Dc:CCC

Federal Lands: DOD (Camp Lejeune, Dare County Bombing Range, Fort Benning); USFS (Apalachicola, Croatan, Francis Marion, Osceola); USFWS (Alligator River, Great Dismal Swamp, Okefenokee, Pocosin Lakes)

ALLIANCE SOURCES

References: Allard 1990, Christensen 1979, Fleming 1998, Kologiski 1977, Schafale and Weakley 1990, Sharitz and Gibbons 1982, Wharton 1978

III.C.2.N.e. Saturated mixed evergreen - cold-deciduous shrubland

III.C.2.N.E. ZENOBIA PULVERULENTA - LYONIA LUCIDA - ILEX (CORIACEA, GLABRA) SATURATED SHRUBLAND ALLIANCE (A.1054)
HONEYCUPS - SHINING FETTERBUSH - (BIG GALLBERRY, LITTLE GALLBERRY) SATURATED SHRUBLAND ALLIANCE

ALLIANCE CONCEPT

Summary: Low pocosins of Outer Coastal Plain peat domes. *Zenobia pulverulenta*, *Lyonia lucida*, *Ilex glabra*, *Ilex coriacea*, and sometimes *Cyrilla racemiflora* are characteristic species and usually codominant in various combinations. This alliance includes mixed evergreen-deciduous low pocosins of peat domes (ombrotrophic blanket bogs) of the Outer Coastal Plain of North Carolina. In these examples, the shrub height (0.5-2 m) is maintained primarily by extremely poor nutrient status, and secondarily by occasional fire. These typically have very scattered, stunted (less than 5 m tall) *Pinus serotina* (less than 10% cover). Other characteristic species include *Ilex coriacea*, *Lyonia lucida*, and *Woodwardia virginica*.

Related Concepts:

- IIC1a. Low Pocosin (Allard 1990) I
- Low Pocosin (Schafale and Weakley 1990) I

Classification Comments: None

ALLIANCE DISTRIBUTION

Range: This alliance is found in North and South Carolina.

Subnations: NC, SC

TNC Ecoregions: 56:P, 57:C

USFS Ecoregions: 232Cb:CCC, 232Ce:CCC, 232Ch:CCC

Federal Lands: USFS (Croatan, Francis Marion)

ALLIANCE SOURCES

References: Allard 1990, Christensen 1979, Frost 1989, Hermann 1991, Kologiski 1977, MacRoberts and MacRoberts 1991, Nixon and Ward 1986, Schafale and Weakley 1990

V. Herbaceous Vegetation

V.A.5.N.k. Seasonally flooded temperate or subpolar grassland

V.A.5.N.K. *RHYNCHOSPORA* SPP. - *PANICUM (RIGIDULUM, VERRUCOSUM)* - *RHEXIA VIRGINICA* SEASONALLY FLOODED HERBACEOUS ALLIANCE (A.1384) BEAKSEDGE SPECIES - (REDTOP PANICGRASS, WARTY PANICGRASS) - VIRGINIA MEADOW-BEAUTY SEASONALLY FLOODED HERBACEOUS ALLIANCE

ALLIANCE CONCEPT

Summary: This alliance accommodates a variety of seasonally flooded vegetation of pondshore and lakeshore environments. It occurs primarily along the Atlantic Coastal Plain from Nova Scotia, Canada, south to Georgia, with inland stations in the central Great Lakes area, the Great Valley of Virginia, and central Tennessee. Occurrences of this alliance are usually small and are dominated predominantly by herbaceous, mostly graminoid, species. Many species are annual or short-lived perennial plants. They persist for years in the seed bank until the hydrologic conditions are right for germination. Thus, species composition of particular stands may change from year to year. In interior stations of this alliance, many of these seedbank plants are species significantly disjunct from their main range on the Atlantic Coastal Plain. There are two major vegetation zones that occur in this environment: Zone 1 is a seasonally flooded zone of sparse cover by graminoids; and Zone 2 is a saturated zone of dense graminoid cover. Some associations may include a zone dominated by taller graminoids, including *Saccharum* spp. or *Scirpus cyperinus*. These zones remain largely intact, but a succession of wet or dry years can cause them to shift slightly in location. Pondshore examples of this alliance occupy a zone around a more open pond center with a longer hydroperiod. These ponds have a pronounced seasonal fluctuation in water level, filling in the winter and drying in the summer. Examples of this alliance from Lower New England and the North Atlantic Coast of Nova Scotia south to Delaware may be found on Coastal Plain pondshores with cobble substrates and little or no organic material accumulation; the broad margins and shorelines of shallow basins or deeper ponds on variable substrates; or on the shores of glacial outwash ponds or large lakes. In the Great Lakes, stands of this alliance are found on sandy pitted outwash plains and glacial lake plains. The level topography of these plains produces gently sloping, shallow basins with no outlets and sometimes no inlets. The water table fluctuates seasonally and yearly. It is highest in late winter and spring, and during years of high precipitation. The soils are derived mainly from sand. The sand is poor in nutrients and is acidic, with pH ranging from 4.4-7.0. These conditions inhibit microbial decomposition and considerable organic material accumulates as peat. The peat mixes with sand or forms more-or-less pure deposits. Basin shorelines typically have stretches of pure sand in areas where wave action is greatest, pure peat in protected areas, and a mixture of the two substrates in other areas. In some basins, an impermeable layer of clay develops 2-5 m below the surface. This layer may hold the local water table above the regional water table for long periods. In the South, this alliance is found in upland depression ponds of the Interior Low Plateau (Eastern Highland Rim) of Tennessee, seasonally flooded anthropogenic peatland depressions in the Great Dismal Swamp of Virginia (where it may occupy seasonally ponded depressions of anthropogenic origin, such as experimental marsh restoration clearings, burned-out peat areas, or depressional basins in powerlines), seasonally flooded upland depressions occurring on clays in the Inner Coastal Plain of southeastern Virginia, as well as Grady Ponds in Georgia and possibly some vegetation of Carolina bays. In central Tennessee examples, vegetation of this alliance may grade down into that of the *Juncus repens* - *Eleocharis microcarpa* Seasonally Flooded Herbaceous Alliance (A.1376).

Related Concepts: No information

Classification Comments: None

ALLIANCE DISTRIBUTION

Range: This alliance is found in Wisconsin, Michigan, Indiana, Massachusetts, Rhode Island, New York, Maryland, Virginia, North Carolina, South Carolina, Georgia, Alabama, Tennessee, and Kentucky. It also occurs in Canada in southern Ontario and Nova Scotia.

Subnations: AL?, CT, DE, GA, IN, KY?, MA, MD, ME, MI, MS?, NC, NH, NJ, NS?, NY, ON, RI, SC?, TN, VA, VT, WI

TNC Ecoregions: 44:C, 45:C, 46:C, 47:?, 48:C, 53:P, 56:C, 57:C, 58:C, 59:C, 61:C, 62:C, 63:C

USFS Ecoregions: 212C:CP, 212D:CP, 212Hu:CCC, 212Hv:CCP, 212Hx:CCC, 212Ka:C??, 221Aa:CCP, 221Ab:CCC, 221Ac:CCP, 221Ad:CCP, 221Ae:CC?, 221Af:CCP, 221Ag:CCP, 221Ai:CCP, 221Al:CCP, 221Ba:CCP, 222Eb:CCC, 222Ge:CCC, 222Ja:CCC, 222Jb:CCC, 222Jc:CCC, 222Jg:CCC, 222Jh:CCC, 222Ji:CCC, 222Jj:CCC, 222Ka:CCC, 222Kb:CCC, 232Aa:CCP, 232Ac:CCC, 232Ba:CCP, 232Bq:CCC, 232Br:CCC, 232Bv:CCC, 232Bz:CCC, 232Cb:CCC, 232Ch:CCC, M221Ab:CCC

Federal Lands: DOD (Arnold, Fort Benning, Fort Gordon, Fort Lee); NPS (Cape Cod); USFS (De Soto?, Francis Marion, George Washington); USFWS (Great Dismal Swamp)

ALLIANCE SOURCES

References: Brodowicz 1989, Faber-Langendoen et al. 1996, Glitzenstein and Streng 2004, Keddy and Sharp 1989, Russo 1997

**V.A.5.N.K. ARISTIDA PALUSTRIS - ANDROPOGON (CAPILLIPES, GLAUCOPSIS) - RHYNCHOSPORA SPP. SEASONALLY FLOODED HERBACEOUS ALLIANCE (A.1364)
LONGLEAF THREE-AWN - (WHITE BLUESTEM, CHALKY BLUESTEM) - BEAKSEDGE SPECIES SEASONALLY FLOODED HERBACEOUS ALLIANCE**

ALLIANCE CONCEPT

Summary: This alliance occupies relatively shallow to deep, seasonally flooded portions of Coastal Plain ponds and lakes, including limesink ponds from the Atlantic Coastal Plain, East Gulf Coastal Plain, and West Gulf Coastal Plain. Characteristic species are *Aristida palustris*, *Andropogon capillipes* ('wetland variant'), *Andropogon glaucopsis*, and *Rhynchospora* spp. Other typical species (some occurring only in parts of the alliance's distribution) are *Andropogon glomeratus* var. *hirsutior*, *Andropogon virginicus*, *Carex glaucescens*, *Centella erecta*, *Coreopsis linifolia*, *Dichantherium longiligulatum*, *Dichantherium scabriusculum*, *Eleocharis equisetoides*, *Eleocharis melanocarpa*, *Eleocharis microcarpa*, *Eleocharis tuberculosa*, *Eriocaulon compressum*, *Eriocaulon decangulare* var. *decangulare*, *Eupatorium leptophyllum*, *Eupatorium mohrii*, *Euthamia leptoccephala*, *Euthamia caroliniana* (= *Euthamia tenuifolia*), *Fuirena bushii*, *Gratiola brevifolia*, *Helenium drummondii*, *Hyptis alata*, *Juncus marginatus*, *Juncus validus*, *Lachnocaulon beyrichianum*, *Leersia hexandra*, *Ludwigia sphaerocarpa*, *Ludwigia suffruticosa*, *Ludwigia microcarpa*, *Ludwigia pilosa*, *Lycopodiella appressa*, *Lycopodiella alopecuroides*, *Lycopodiella caroliniana*, *Panicum hemitomom*, *Panicum tenerum*, *Panicum virgatum*, *Proserpinaca palustris*, *Proserpinaca pectinata*, *Rhexia mariana*, *Rhynchospora caduca*, *Rhynchospora cephalantha*, *Rhynchospora elliotii*, *Rhynchospora fascicularis* var. *fascicularis*, *Rhynchospora microcarpa*, *Sabatia campanulata*, *Scleria baldwinii*, *Scleria georgiana*, *Stylisma aquatica*, and *Xyris fimbriata*. Scattered trees, especially *Nyssa biflora*, can occur, though ponds are usually treeless. Wetland shrubs such as *Hypericum brachyphyllum* and *Hypericum galioides* are sometimes common or locally dominant in shallower ones.

Related Concepts:

- Basin Marsh (FNAI 1992a) ?
- Flatwoods Pond (Smith 1996a) I
- Flatwoods Pond (Smith 1996b) I
- Limestone Sink (Nelson 1986) I
- Small Depression Pond (Schafale and Weakley 1990) I

Classification Comments: Examples exist at Paynes Prairie State Preserve, Alachua County, Florida. This alliance is near the conceptual boundary of several hydrologic descriptors, and, in addition, the hydrologic expression may vary from year to year, confounding hydrologic placement. Laessle (1942) describes an *Andropogon brachystachyus* - *Andropogon capillipes* Association from northeastern Florida, which could represent an additional association.

This alliance needs further study in relation to other southeastern Coastal Plain pond alliances such as the *Dichantherium (erectifolium, wrightianum) - Rhynchospora filifolia* Seasonally Flooded Herbaceous Alliance (A.1370), the *Panicum hemitomom* Seasonally Flooded Temperate Herbaceous Alliance (A.1379), and the *Rhynchospora (careyana, inundata)* Seasonally Flooded Herbaceous Alliance (A.1383).

ALLIANCE DISTRIBUTION

Range: This alliance is found from the Atlantic Coastal Plain, East Gulf Coastal Plain, and West Gulf Coastal Plain. It occurs in Alabama, Florida, Georgia, Louisiana, North Carolina, South Carolina, and Texas, and possibly Mississippi (?).

Subnations: AL, FL, GA, LA, NC, SC, TX

TNC Ecoregions: 41:C, 53:C, 55:C, 56:C, 57:C

USFS Ecoregions: 232Ba:CCP, 232Bb:CCP, 232Bc:CCP, 232Bd:CC?, 232Bf:CCC, 232Bg:CCP, 232Bh:CCP, 232Bi:CCP, 232Bj:CCP, 232Bk:CCP, 232Bl:CCP, 232Bm:CCP, 232Bn:CCP, 232Bo:CCP, 232Bp:CCP, 232Bq:CC?, 232Br:CCC, 232Bu:CCP, 232Bv:CCP, 232Ca:CCP, 232Cb:CCC, 232Cc:CCP, 232Cd:CCP, 232Ce:CC?, 232Cf:CCP, 232Ch:CCC, 232Ci:CC?, 232Da:CCP, 232Db:CCP, 232Dc:CCP, 232Dd:CP?, 232De:CP?, 232Ea:CCP, 232Eb:CP?, 232Ee:CP?, 232Fa:CCP, 232Fb:CCC, 232Fe:CCP, 232Ga:C??, 232Gb:C??, 232Gc:C??, 232Gd:C??, 234Ad:???

Federal Lands: DOD (Fort Stewart?, Sunny Point); USFS (Apalachicola?, Conecuh, Croatan, Francis Marion, Ocala)

ALLIANCE SOURCES

References: FNAI 1992a, FNAI 1992b, Laessle 1942, Nelson 1986, Schafale and Weakley 1990, Smith 1996a, Smith 1996b

**V.A.5.N.K. CAREX STRIATA SEASONALLY FLOODED HERBACEOUS ALLIANCE (A.1426)
PEATLAND SEDGE SEASONALLY FLOODED HERBACEOUS ALLIANCE**

ALLIANCE CONCEPT

Summary: This alliance includes Coastal Plain depression meadows, dominated by *Carex striata* (= *Carex walteriana*). Associations include vegetation on the outer margins of Coastal Plain pondshores in New York and Delaware or in localized swales in the New Jersey pine barrens. Substrate is typically composed of sand and gravel, but some community types may occur on organic

muck. *Carex striata* usually occurs in dense stands with few other associates, which may include seedlings of *Cephalanthus occidentalis* and *Acer rubrum*, as well as *Cladium mariscoides*, *Rhexia virginica*, and *Panicum hemitomon*. *Sphagnum* is often abundant. Tyndall et al. (1990) describe *Carex striata* communities from Maryland. This alliance is also known from depression meadows in North Carolina and South Carolina, and is assumed to occur in Virginia. A Florida association is found in seasonally flooded peat depressions.

Related Concepts:

- Depression Meadow (Nelson 1986) I

Classification Comments: The northern part of the alliance's range is occupied by *Carex striata* var. *brevis*, the southern by *Carex striata* var. *striata*. The latter taxon occurs in zones of a depression pond at Fort Benning, Georgia, but not at a sufficient scale to be recognized as an association.

ALLIANCE DISTRIBUTION

Range: This alliance is found in Florida, North Carolina, South Carolina, Delaware, Maryland, New Jersey, New York, and Virginia. Tyndall et al. (1990) describe *Carex striata* (as *Carex walteriana*) communities from Maryland. This alliance is also known from depression meadows in North Carolina and South Carolina, and is assumed to occur in Virginia.

Subnations: DE, FL, GA?, MD, NC, NJ, NY, SC, VA

TNC Ecoregions: 53:C, 56:C, 57:C, 58:C, 62:C

USFS Ecoregions: 221Aa:???, 232Aa:CPP, 232Ac:CPP, 232Ba:CCP, 232Br:CCP, 232Bt:CCC, 232Ca:CCC, 232Cb:CCC, 232Ce:CCC, 232Ch:CCC, 232Dc:CCC

Federal Lands: USFS (Francis Marion, Osceola)

ALLIANCE SOURCES

References: Nelson 1986, Tyndall et al. 1990

**V.A.5.N.K. SCIRPUS CYPERINUS SEASONALLY FLOODED HERBACEOUS ALLIANCE (A.1386)
WOOLGRASS BULRUSH SEASONALLY FLOODED HERBACEOUS ALLIANCE**

ALLIANCE CONCEPT

Summary: This alliance, which is found in the eastern and southeastern United States, inhabits seasonally flooded marshes or emergent zones of upland depression ponds. The vegetation is dominated by *Scirpus cyperinus*, or at least with substantial cover of this species. The habitat of this alliance may have a pronounced seasonal fluctuation in water level, becoming saturated to ponded in the winter and often drying completely in the summer. The vegetation is typically dominated by patches or zones of *Scirpus cyperinus*; other species present may include *Carex* spp., *Dichanthelium* spp., *Dulichium arundinaceum*, *Glyceria* spp., *Juncus* spp., *Leersia* spp., *Panicum rigidulum*, *Rhynchospora* spp., and *Thelypteris palustris*, as well as other species of *Scirpus* including *Scirpus microcarpus* (= *Scirpus rubrotinctus*) and *Scirpus atrovirens*. The vegetation may consist of monospecific clumps of the component species, either scattered in the marsh or around the pond margin. Mats of *Sphagnum* mosses may be prominent in some examples (e.g., *Sphagnum lescurii*, *Sphagnum pylaiesii*, *Sphagnum cuspidatum*, *Sphagnum palustre*, and *Sphagnum recurvum*). Some examples may have scattered woody plants, including shrubs and small trees such as *Acer rubrum*, *Alnus serrulata*, *Cephalanthus occidentalis*, *Rosa palustris*, and *Nyssa sylvatica*. To the north, *Vaccinium corymbosum* is a typical associate, while *Hibiscus moscheutos*, *Itea virginica*, *Liquidambar styraciflua*, *Pinus taeda*, and *Quercus phellos* occur more frequently in the southern portion of the range. Sparsely distributed shrubs in montane examples may include *Vaccinium* spp. and *Leucothoe racemosa*. The floristics and physiognomic expression may vary with context and management. In a burned or mowed context, examples of this vegetation type may grade down into other wetland herbaceous types, but in a more forested context may grade into upland depression forests.

Related Concepts:

- *Scirpus cyperinus*-*Dulichium* Pond (Newell and Peet 1995) ?
- IIE1g. Interior Vernal Pool Complex (Allard 1990) I
- Shallow emergent marsh (Cowardin et al. 1979) ?
- Upland Pool (Schafale and Weakley 1990) I

Classification Comments: None

ALLIANCE DISTRIBUTION

Range: This alliance is documented from the Southern Blue Ridge of North Carolina, the Interior Low Plateau of Tennessee and other states, the Atlantic Coastal Plain, the East Gulf Coastal Plain, Upper East Gulf Coastal Plain, Lower New England, the North Atlantic Coast, and from the Chesapeake Bay Lowlands (Delmarva Peninsula of Virginia, Chincoteague NWR). It could occur in adjacent provinces (e.g., Central Appalachians, High Allegheny Plateau, Piedmont, Ridge and Valley).

Subnations: AL, AR?, CT, DE, FL?, GA, IN, KY, LA?, MA, MD?, ME, MS?, NC, NH, NJ, NY, PA, RI, SC, TN, VA, VT, WV

TNC Ecoregions: 42:P, 43:C, 44:C, 50:P, 51:C, 52:P, 53:C, 56:P, 57:C, 58:C, 59:C, 60:?, 61:C, 62:C, 64:C

USFS Ecoregions: 221Ab:CCC, 221H:CP, 221J:CP, 222Cf:CCP, 222Cg:CCP, 222Eb:CCC, 222Eg:CCP, 222Eh:CCP, 231A:CP, 231Bc:CCC, 232B:CC, 232C:CP, 232D:CP, 234A:PP, M221Dc:CCC

Federal Lands: DOD (Arnold, Fort Benning); NPS (Cape Cod); USFS (Chattahoochee?, Francis Marion, Oconee?, Pisgah, Talladega, Tuskegee?); USFWS (Chincoteague)

ALLIANCE SOURCES

References: Allard 1990, Cowardin et al. 1979, Glitzenstein and Streng 2004, Newell and Peet 1995, Schafale and Weakley 1990, Weakley and Schafale 1994

V.A.5.N.n. Tidal temperate or subpolar grassland

V.A.5.N.N. *ZIZANIA AQUATICA* TIDAL HERBACEOUS ALLIANCE (A.1484) INDIAN WILD RICE TIDAL HERBACEOUS ALLIANCE

ALLIANCE CONCEPT

Summary: This alliance contains freshwater tidal marshes dominated by tall graminoids. *Zizania aquatica* is usually dominant or codominant with other graminoids such as *Typha angustifolia*, *Schoenoplectus fluviatilis* (= *Scirpus fluviatilis*), and *Sparganium eurycarpum*. These marshes typically occur along tidal river systems (in shallow bays, shoals, or at the mouth) within the reach of the tide, but beyond the influence of saline waters. Soils are highly variable and are composed of varying amounts of silts, silty mucks, fine peat, to very coarse sands. Other characteristic species include *Sagittaria latifolia*, *Leersia oryzoides*, *Amaranthus cannabinus*, *Impatiens capensis*, *Bidens bidentoides*, *Acorus americanus*, and *Echinochloa walteri*. In the Southeast, *Zizania aquatica*-dominated vegetation occurs primarily as fringing marshes along tidal freshwater rivers. Communities of this alliance occur in Coastal Plain from Maine south and west to Louisiana.

Related Concepts:

- Estuarine Intertidal: Freshwater Tidal Marsh (Swain and Kearsley 2001) ?
- Tidal Freshwater Marsh (Schafale and Weakley 1990) I Wild Rice Community Type (Odum et al. 1984) ?

Classification Comments: None

ALLIANCE DISTRIBUTION

Range: Communities of this alliance occur in Coastal Plain from Maine south and west to Louisiana. This alliance is found in Alabama, Louisiana, Mississippi, South Carolina, North Carolina, Connecticut, Delaware, Massachusetts, Maine, Maryland, New Jersey, New York, Rhode Island, and Virginia, and possibly Florida (?), and Georgia (?).

Subnations: AL, CT, DE, FL?, GA?, LA, MA, MD, ME, MS, NC, NJ, NY, RI, SC, VA

TNC Ecoregions: 53:C, 55:P, 56:P, 57:C, 58:C, 61:C, 62:C

USFS Ecoregions: 212Da:PPP, 212Db:PPP, 212Dc:PPP, 212Ea:P??, 221Aa:CCP, 221Ab:CCC, 221Ac:CC?, 221Ad:CCC, 221Ae:CCP, 221Af:CCC, 221Ag:CCC, 221Ak:CCP, 221Ba:C??, 222Ie:???, 232Aa:CCP, 232Ab:CCC, 232Ac:CCP, 232Ad:CCC, 232Bb:CCP, 232Bc:CCP, 232Bd:CCP, 232Br:CCC, 232Bt:CCC, 232Bx:CCC, 232Bz:CCC, 232Cb:CCP, 232Ce:CCC, 232Ch:CCP, 232Ci:CCP, 232Cj:CCP, 232Db:CCP, 232Dc:CCC

Federal Lands: NPS (Cape Cod); USFS (Croatian, Francis Marion)

ALLIANCE SOURCES

References: Glitzenstein and Streng 2004, Odum et al. 1984, Schafale and Weakley 1990, Swain and Kearsley 2001, Wharton 1978
V.B.2.N.h. Seasonally flooded temperate perennial forb vegetation

V.B.2.N.H. *POLYGONUM* SPP. (SECTION *PERSICARIA*) SEASONALLY FLOODED HERBACEOUS ALLIANCE (A.1881) SMARTWEED SPECIES SEASONALLY FLOODED HERBACEOUS ALLIANCE

ALLIANCE CONCEPT

Summary: This alliance covers various wet depressions, lakes, and ponds dominated by various *Polygonum* species (section Persicaria), singly or in combination, or with other obligate wetland plant species. Associations have been described that are dominated by, or contain, *Polygonum amphibium*, *Polygonum densiflorum*, *Polygonum hydropiperoides*, *Polygonum lapathifolium*, *Polygonum pennsylvanicum*, *Polygonum punctatum*, and/or related *Polygonum* spp. The many associated species vary with geography and habitat. In western Kentucky, this alliance occurs in marshes associated with the Ohio River in backflood areas around oxbows, beaver-flooded areas, levees, and depressional drainages. Associated species include *Nelumbo lutea*, *Cephalanthus occidentalis*, *Sagittaria brevirostra*, *Peltandra virginica*, and *Juncus effusus*. Associates in Oklahoma include *Ammannia coccinea*, *Helianthus annuus*, *Lemna minor*, *Stuckenia pectinata* (= *Potamogeton pectinatus*), *Spirodela polyrrhiza*, *Utricularia gibba* (= *Utricularia biflora*), and *Xanthium strumarium*. In Mississippi, one example of this vegetation is dominated by the perennial *Polygonum densiflorum*; associated species include *Lemna minor*, *Saccharum giganteum*, *Hydrocotyle umbellata*, *Saururus cernuus*, *Carex lupulina*, *Triadenum walteri*, *Cephalanthus occidentalis*, *Leersia* sp., *Ludwigia peploides*, *Boehmeria cylindrica*, *Juncus effusus*, *Rhynchospora corniculata*, *Ludwigia decurrens*, *Habenaria repens*, *Mikania scandens*, *Scirpus cyperinus*, and others. It occurs as a band ringing the shores of ponds in the East Gulf Coastal Plain and along the banks of ditches and sloughs in the Mississippi River Alluvial Plain. This alliance also occurs in a wide variety of human- and beaver-created wetlands. Composition is highly variable and

re-evaluation may be required as additional data become available. In the western United States and adjacent Canada, this alliance is found primarily over a wide elevational range from near sea level to over 2700 m. Stands are found in permanently flooded depressions such as margins of lake shores and oxbow lakes in river floodplains. The vegetation is characterized by the dominance or codominance of *Polygonum amphibium*. Associates may include species of *Potamogeton* and other aquatic plants.

Related Concepts:

- *Persicaria amphibia* Association (Cooper and Severn 1992) ?
- *Polygonum amphibium* herbaceous series (Hoagland 1997) I
- *Polygonum pensylvanicum* herbaceous series (Hoagland 1997) I
- *Polygonum* spp. (section *Persicaria*) herbaceous alliance (Hoagland 1998a) ?
- Freshwater Aquatic Beds (Chappell et al. 1997) ?

Classification Comments: None

ALLIANCE DISTRIBUTION

Range: This alliance is found in Alabama, Arkansas, Iowa, Illinois, Kentucky, Mississippi, Missouri, North Carolina, Oklahoma, South Carolina, Tennessee, Wisconsin, and possibly Georgia (?), Indiana (?), Louisiana (?), and Texas (?). In the western United States, this alliance is found in California, Oregon, Washington, Montana, and Colorado. It also occurs in Ontario, Canada.

Subnations: AL, AR, BC, CA?, CO, FL?, GA, IA, ID, IL, IN, KY, LA?, MO, MS, MT, NC, OK, OR, SC, TN, TX?, UT, WA, WI
TNC Ecoregions: 2:C, 6:C, 10:C, 19:C, 20:C, 26:C, 27:C, 28:P, 32:C, 33:C, 36:C, 37:C, 38:C, 39:C, 42:C, 43:C, 44:C, 45:C, 46:C, 47:P, 48:C, 50:C, 51:P, 52:C, 53:C, 56:C, 57:C

USFS Ecoregions: 212Ja:PPP, 212Jb:PPP, 212Jc:PPP, 212Je:PPP, 212Jf:PPP, 212Jj:PPP, 212Jl:PPP, 212Jm:PPP, 221Ha:CCC, 221Hb:CCC, 221Hc:CCC, 221Hd:CC?, 221He:CCC, 222Ab:CCC, 222Ag:CCC, 222Aj:CCC, 222Ak:CC?, 222Am:CCC, 222Ce:CCP, 222Cf:CCP, 222Cg:CCC, 222Db:CCC, 222Eb:CCC, 222Eg:CCP, 222Ej:CCC, 222En:CCC, 222Eo:CCC, 222Gc:CCC, 222Jb:CCC, 222Ji:CCC, 222Jj:CCC, 222Kf:CCC, 231Aa:CCC, 231Ae:CCP, 231Af:CCP, 231Ao:CCC, 231Bc:CC?, 231Bd:CC?, 231Be:CC?, 231Bk:CC?, 231Cd:CCC, 231D:CP, 231E:CP, 231Ga:CCC, 231Gb:CCC, 232Bj:CCC, 232Bl:CCC, 232Bs:CCC, 232Cb:CCC, 232D:CP, 232E:CP, 232F:CP, 234An:CCC, 242A:CC, 251Cc:CCC, 251Cd:CC?, 251Cf:CCC, 251Cg:CCC, 251Ck:CCC, 251Eb:CCC, 251F:CC, 255A:CC, 311A:CC, 315B:PP, 315C:PP, 331B:CC, 331D:CC, 331F:CP, 331G:CC, 331I:C?, 332C:CP, 332E:CC, 341C:CC, 342B:CC, 342C:C?, M221Cd:CCC, M222A:??, M231A:??, M242A:CC, M242B:CC, M242C:CC

Federal Lands: COE (Claiborne Lake); DOD (Fort Benning); NPS (Great Smoky Mountains, Shiloh); USFS (Bankhead, Bienville, Daniel Boone, Francis Marion, Oconee, Talladega?); USFWS (Lacreek, Ouray, Reelfoot)

ALLIANCE SOURCES

References: Chappell et al. 1997, Christy and Putera 1993, Cooper and Severn 1992, Faber-Langendoen et al. 1996, Hansen et al. 1991, Hansen et al. 1995, Hitchcock et al. 1977b, Hoagland 1997, Hoagland 1998a, Johnson 1932a, Johnson 1932b, Johnson 1936, Johnson 1939, Johnson 1941, Kunze 1994, Ramaley 1930, Ramaley 1942

V.B.2.N.H. WOODWARDIA VIRGINICA SEASONALLY FLOODED HERBACEOUS ALLIANCE (A.1713)

VIRGINIA CHAINFERN SEASONALLY FLOODED HERBACEOUS ALLIANCE

ALLIANCE CONCEPT

Summary: This alliance covers seasonally flooded wetland depressions, often strongly dominated by *Woodwardia virginica*, which occur in acid sands of the Coastal Plain. More information is needed on the expression of this small-scale alliance. The vegetation may be tall, reaching up to 1.5 meters in height. Additional associates include *Triadenum virginicum*, *Carex striata*, *Hypericum mutilum*, and *Decodon verticillatus*. It is attributed to various states in the Atlantic Coastal Plain from Delaware to Florida.

Related Concepts:

- *Anchistea/Sphagnum* Association (Laessle 1942) ?
- Small Depression Pond (Schafale and Weakley 1990) I

Classification Comments: None

ALLIANCE DISTRIBUTION

Range: This alliance is found in Florida, Georgia, North Carolina, South Carolina, Maryland, Virginia, and Delaware.

Subnations: DE, FL, GA, MD, NC, SC, VA?

TNC Ecoregions: 53:P, 55:C, 56:C, 57:C, 58:C

USFS Ecoregions: 232Bf:CC?, 232Bz:CC?, 232Ca:CCP, 232Cb:CCC, 232Ce:CCC, 232Ch:CCC, 232Ga:CCC

Federal Lands: USFS (Francis Marion)

ALLIANCE SOURCES

References: Laessle 1942, Schafale and Weakley 1990

ASSOCIATIONS GROUPED BY ECOLOGICAL SYSTEM

UPLANDS, VEGETATED

ATLANTIC COASTAL PLAIN DRY AND DRY-MESIC OAK FOREST

WHITE OAK - MOCKERNUT HICKORY / MAYBERRY FOREST

ELEMENT IDENTIFIERS

NVC association: *Quercus alba* - *Carya alba* / *Vaccinium elliotii* Forest [Provisional]

Database Code: CEGLO07224

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

Alliance: *Quercus alba* - (*Quercus nigra*) Forest Alliance (A.238)

ELEMENT CONCEPT

Summary: This generally defined association covers acidic, dry-mesic forests of the Coastal Plain from the Mississippi River eastward. The canopy of stands would contain *Quercus alba* and *Carya alba*, with *Vaccinium elliotii* conspicuous in the understory. More information is needed on the detailed floristics and range of this somewhat conceptual association.

Environment: No information

Vegetation: The canopy of stands of this somewhat conceptual association would contain *Quercus alba* and *Carya alba*, with *Vaccinium elliotii* conspicuous in the understory.

Dynamics: No information

Similar Associations:

- *Quercus alba* - *Carya alba* / *Chasmanthium sessiliflorum* West Gulf Coastal Plain Forest (CEGL008413) -- is a related type specific to the Upper West Gulf Coastal Plain.
- *Quercus alba* - *Carya glabra* - *Carya alba* / *Aesculus pavia* Forest (CEGL007225) -- a presumably less acidic but related association.
- *Quercus alba* - *Carya glabra* / Mixed Herbs Coastal Plain Forest (CEGL007226) -- another somewhat conceptual but related association.

Related Concepts:

- T1B4aII4a. *Quercus alba* - *Carya* spp. (*ovata*, *alba*) (Foti et al. 1994) ?

Classification Comments: Examples at Camassia Slope TNC Preserve, North Carolina. More information is needed on the detailed floristics and range of this somewhat conceptual association. This association needs clarification and expansion, and subsequent range determination.

CONSERVATION RANKING & RARE SPECIES

GRank: G5? (1997-8-14): No information

High-ranked species: No information

ELEMENT DISTRIBUTION

Range: This association is thought to be distributed in the Coastal Plain from the Mississippi River eastward to the Carolinas. It does not occur in Texas.

Subnations: AL?, AR?, GA?, MS, NC, SC, TN?

TNC Ecoregions: 42:C, 43:C, 53:C, 56:C, 57:C

USFS Ecoregions: 232Cb:CCC

Federal Lands: USFS (Bienville, Conecuh?, Croatan, De Soto, Francis Marion, Holly Springs, Homochitto, Tombigbee, Tuskegee)

ELEMENT SOURCES

References: Foti 1994b, Foti et al. 1994, Peet et al. unpubl. data 2002, Southeastern Ecology Working Group n.d.

WHITE OAK - PIGNUT HICKORY - MOCKERNUT HICKORY / RED BUCKEYE FOREST

ELEMENT IDENTIFIERS

NVC association: *Quercus alba* - *Carya glabra* - *Carya alba* / *Aesculus pavia* Forest

Database Code: CEGLO07225

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

Alliance: *Quercus alba* - (*Quercus nigra*) Forest Alliance (A.238)

ELEMENT CONCEPT

Summary: This type is a nutrient-rich, calcareous to subcalcareous, mesic Coastal Plain forest found east of the Mississippi River, extending to the Mid-Atlantic Coastal Plain of North Carolina and possibly Virginia. Stands contain *Quercus alba*, *Carya glabra*, and *Carya alba* in the canopy, and *Aesculus pavia* in the understory and shrub layer. Some other canopy components include *Quercus nigra*, *Carya pallida* (in drier stands), *Fraxinus americana*, *Liriodendron tulipifera*, and *Liquidambar styraciflua*. The subcanopy may contain *Liquidambar styraciflua*, *Cornus florida*, *Nyssa sylvatica*, *Morus rubra*, *Celtis occidentalis*, *Ostrya virginiana*, *Acer rubrum*, *Diospyros virginiana*, *Prunus serotina*, *Ulmus alata*, and/or *Quercus velutina*. Some other possible shrubs include *Arundinaria gigantea*, *Asimina parviflora*, *Callicarpa americana*, *Quercus alba*, *Quercus velutina*, *Vaccinium elliotii*, *Rubus argutus*, and *Vaccinium fuscatum*. Typical vines include *Vitis rotundifolia*, *Parthenocissus quinquefolia*, *Cocculus carolinus*, *Smilax bona-nox*, *Smilax glauca*, *Berchemia scandens*, and *Toxicodendron radicans*. More information is needed on the detailed range, environment, and floristics of this association.

Environment: No information

Vegetation: Stands of this association contain *Quercus alba*, *Carya glabra*, and *Carya alba* in the canopy, and *Aesculus pavia* in the understory. Vegetation from Fort Benning, Georgia, which appears to be compatible with this concept contains *Quercus alba*, *Quercus nigra*, *Carya pallida*, *Carya alba*, and *Fraxinus americana* in the canopy, *Cornus florida* and *Liriodendron tulipifera* in the subcanopy as well as *Aesculus pavia*, *Vitis rotundifolia*, *Callicarpa americana*, *Aralia spinosa*, *Polygonatum biflorum*, *Hexastylis arifolia*, *Aristolochia serpentaria*, *Elephantopus tomentosus*, *Matelea* sp., and *Passiflora lutea*. This stand would not be on a completely calcareous soil, being found in a more sandy landscape (some sands have a calcareous shell fraction). The concept of this type may be somewhat expanded to accommodate these data. See also stand data from plot TALO.35, Five Mile Branch, Talladega-Oakmulgee National Forest. This example differs from the stand at Fort Benning, but is probably also compatible with the concept of this type. This stand is dominated by *Quercus alba*, *Liriodendron tulipifera*, and *Liquidambar styraciflua*. Other oak species are not in the canopy and have negligible cover in the subcanopy. The subcanopy contains *Liquidambar styraciflua*, *Cornus florida*, *Nyssa sylvatica*, *Morus rubra*, *Prunus serotina*, *Ulmus alata*, and *Quercus velutina*. The hickories *Carya alba* and *Carya glabra* (nominals in this association), as well as *Aesculus pavia*, are present in the shrub layer. Other small trees and shrubs include *Arundinaria gigantea*, *Diospyros virginiana*, *Asimina parviflora*, *Callicarpa americana*, *Acer rubrum*, *Quercus alba*, *Quercus velutina*, *Celtis occidentalis*, *Ostrya virginiana*, *Nyssa sylvatica*, *Vaccinium elliotii*, *Rubus argutus*, and *Vaccinium fuscatum*. Typical vines include *Vitis rotundifolia*, *Parthenocissus quinquefolia*, *Cocculus carolinus*, *Smilax bona-nox*, *Smilax glauca*, *Berchemia scandens*, and *Toxicodendron radicans*. Herbs in this particular stand include *Acalypha gracilens*, *Aristolochia serpentaria*, *Chamaelirium luteum*, *Chasmanthium sessiliflorum* (most frequent here), *Desmodium* sp., *Dichantheium* sp., *Dioscorea quaternata*, *Euphorbia pubentissima*, *Hexastylis arifolia*, *Mitchella repens*, *Ruellia caroliniensis*, *Smilax hugeri*, *Viola* spp., and *Athyrium filix-femina* ssp. *asplenoides* (NatureServe Ecology unpubl. data).

Dynamics: No information

Similar Associations:

- *Quercus alba* - *Carya alba* / *Chasmanthium sessiliflorum* West Gulf Coastal Plain Forest (CEGL008413) -- of the West Gulf Coastal Plain.
- *Quercus alba* - *Carya alba* / *Vaccinium elliotii* Forest [Provisional] (CEGL007224) -- a related more acidic type.

Related Concepts: No information

Classification Comments: This association needs additional clarification and expansion, and subsequent range determination. More information is needed on specific examples of this association and how to floristically distinguish it from the clearly related *Quercus alba* - *Carya alba* / *Vaccinium elliotii* Forest [Provisional] (CEGL007224).

CONSERVATION RANKING & RARE SPECIES

GRank: G4? (2003-3-28): Based on a relatively large natural range throughout the Coastal Plain, this is presumably not a rare forest type. However, within this range calcareous to subcalcareous environments are less common than acidic ones. In addition, most examples have been impacted by removal of the more valuable timber species (e.g., *Quercus alba*), and remaining ones on private land are highly vulnerable to canopy removal and conversion to other forest types or other land uses. It would be restricted to the Coastal Plain of the United States.

High-ranked species: *Brickellia cordifolia* (G2G3), *Croomia pauciflora* (G3)

ELEMENT DISTRIBUTION

Range: This forest is found in the Coastal Plain east of the Mississippi River, extending from Alabama and possibly Arkansas, to North Carolina and possibly Virginia.

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

TNC Ecoregions: 43:C, 53:C, 56:C, 57:C

USFS Ecoregions: 231B:CC, 232B:CC, 232Cb:CCC, 232Ce:CCC

Federal Lands: DOD (Fort Benning); USFS (Croatan?, De Soto, Francis Marion, Holly Springs?, Homochitto?, Talladega, Tombigbee?, Tuskegee)

ELEMENT SOURCES

References: NatureServe Ecology - Southeastern U.S. unpubl. data, Peet et al. unpubl. data 2002, Schafale and Weakley 1990, Southeastern Ecology Working Group n.d.

ATLANTIC COASTAL PLAIN LONGLEAF PINE WOODLAND

LONGLEAF PINE - (LOBLOLLY PINE) / LITTLE BLUESTEM - DOLLARLEAF WOODLAND

ELEMENT IDENTIFIERS

NVC association: *Pinus palustris* - (*Pinus taeda*) / *Schizachyrium scoparium* - *Rhynchosia reniformis* Woodland

Database Code: C EGL007738

Formation: Rounded-crowned temperate or subpolar needle-leaved evergreen woodland (II.A.4.N.a)

Alliance: *Pinus palustris* Woodland Alliance (A.520)

ELEMENT CONCEPT

Summary: This longleaf pine woodland occurs on upland flats on sandy loam soils of the inner Atlantic Coastal Plain. This community has an open to scattered to mostly closed canopy of *Pinus palustris* and/or *Pinus taeda* (the latter because of fire suppression and landscape alteration), a moderate to dense shrub layer dominated by dry-mesic tree species listed above, as well as more typical shrub species, such as *Vaccinium stamineum*, *Gaylussacia frondosa*, *Morella cerifera* (= *Myrica cerifera*), *Viburnum dentatum*, *Rhus copallinum*, and likely others. The herbaceous dominant is *Schizachyrium scoparium*, but other species typical of savanna vegetation are present, including *Eupatorium rotundifolium*, *Chrysopsis mariana*, *Rhynchosia reniformis*, *Solidago rugosa*, *Solidago odora*, *Seymeria cassioides*, and *Pityopsis graminifolia*. This association is documented in the Mid-Atlantic Coastal Plain, in the 'wiregrass gap' of central South Carolina. This description is based on degraded stands documented at Congaree Swamp National Monument, and may need alteration based on additional information. This type is intended to cover the concept of mesic to dry-mesic longleaf pine woodlands of the "wiregrass gap," i.e., the area in South Carolina between the range of *Aristida stricta* and *Aristida beyrichiana*.

Environment: This woodland occurs on upland flats on sandy loam soils of the inner Atlantic Coastal Plain. At least part of the known stand is on the Persanti soil series (C. Frost pers. comm.), which consists of very deep, moderately well-drained, slowly permeable soils that formed in thick clayey sediments on old stream terraces on the Coastal Plain. They are saturated to within 2 feet of the surface in late winter and early spring. Slopes range from 0-6%. The series is a fine, kaolinitic, thermic Aquic Paleudult. The terrain in which this vegetation is found consists of an extensive upper terrace which grades down to a narrower lower terrace which is immediately above the bottomlands of the Congaree Swamp. Only small parts of the lower terrace are owned by the National Park Service as part of the Congaree Swamp National Monument (COSW), the vegetation of which is what this type is based on. Restoration plans are underway for this stand, and possibly for some adjacent private land on the upper terrace as well.

Vegetation: This community has an open to scattered to mostly closed canopy of *Pinus taeda* and/or *Pinus palustris*, a moderate to dense shrub layer dominated by dry-mesic tree species listed above, as well as more typical shrub species, such as *Vaccinium stamineum*, *Gaylussacia frondosa*, *Morella cerifera* (= *Myrica cerifera*), *Viburnum dentatum*, *Rhus copallinum*, and likely others. The herbaceous dominant is *Schizachyrium scoparium*, but other species typical of savanna vegetation are present, including *Eupatorium rotundifolium*, *Chrysopsis mariana*, *Rhynchosia reniformis*, *Solidago rugosa*, *Solidago odora*, *Seymeria cassioides*, and *Pityopsis graminifolia*. Some additional herbs which have been observed at the site include *Panicum anceps* (= var. *rhizomatium*), *Elephantopus* sp., *Helianthus angustifolius*, *Gymnopogon brevifolius*, *Pycnanthemum* sp., and *Platanthera ciliaris*? (M. Pyne pers. obs.).

Dynamics: This woodland is maintained by fire. Attempts should be made to reconstruct a more natural fire frequency and periodicity. Canopy closure directly reflects fire frequency and periodicity, and some occurrences may have mostly closed canopies.

Similar Associations:

- *Pinus palustris* - *Pinus* (*echinata*, *taeda*) / (*Liquidambar styraciflua*) / *Schizachyrium scoparium* Woodland (CEGL003609) -- is known from the West Gulf Coastal Plain.

Related Concepts:

- *Pinus palustris* - *Pinus taeda* / *Schizachyrium scoparium* Woodland (TNC 1998b) ?

Classification Comments: This association was described based on 1998 data from the Congaree Swamp National Monument. This woodland is maintained by fire. Attempts should be made to reconstruct a more natural fire frequency and periodicity. Canopy closure directly reflects fire frequency and periodicity, and some occurrences may have mostly closed canopies. Sites are being managed with ecological burning (2000-10-24). The more "natural" condition would presumably consist of greater dominance by *Pinus palustris*, with the current presence of *Pinus taeda* being a result of its encroachment from adjacent stands with subsequent fire suppression. The relative dominance of oaks and other hardwoods in the understory will be reduced through management. Highly managed or recently burned stands will have reduced canopy closure. With lack of fire management, stands could revert to vegetation dominated by *Pinus taeda* and *Quercus falcata*, with more dense and shrub-dominated understories. This type is intended to cover the concept of mesic to dry-mesic longleaf pine woodlands of the "wiregrass gap," i.e., the area in South Carolina between the range of *Aristida stricta* and *Aristida beyrichiana*.

CONSERVATION RANKING & RARE SPECIES

GRank: G1 (2001-1-31): This woodland is maintained by fire. Attempts should be made to reconstruct a more natural fire frequency and periodicity. This community is rare due to lack of natural fire. Some poor-quality, but restorable examples are conserved on the Congaree Swamp National Monument, South Carolina. The more 'natural' condition would consist of greater dominance by *Pinus palustris*, with the presence of *Pinus taeda* being a result of its encroachment from adjacent stands with subsequent fire suppression. The relative dominance of oaks and other hardwoods in the understory will be reduced through management. Highly managed or recently burned stands will have reduced canopy closure. With lack of fire management, stands could revert to vegetation dominated by *Pinus taeda* and *Quercus falcata*, with more dense and shrub-dominated understories.

High-ranked species: No information

ELEMENT DISTRIBUTION

Range: This association is documented in the Mid-Atlantic Coastal Plain of central South Carolina. Floristically related vegetation would be expected in portions of the Georgia Inner Coastal Plain which lack wiregrass, but this is not included here. More information is needed.

Subnations: SC

TNC Ecoregions: 56:P, 57:C

USFS Ecoregions: 232Bs:CCC, 232Cb:CCC

Federal Lands: NPS (Congaree Swamp); USFS (Francis Marion)

ELEMENT SOURCES

References: Frost pers. comm., Peet et al. unpubl. data 2002, Pyne pers. comm., Southeastern Ecology Working Group n.d., TNC 1998b

LONGLEAF PINE PLANTED FOREST

ELEMENT IDENTIFIERS

NVC association: *Pinus palustris* Planted Forest

Database Code: CEGLO07176

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

Alliance: *Pinus palustris* Planted Forest Alliance (A.96)

ELEMENT CONCEPT

Summary: This association includes young, monospecific plantation stands of *Pinus palustris* that are maintained for the extraction of forest products. The core concept of these stands are those which are mechanically planted to dense, often perfect rows of planted *Pinus palustris* or otherwise dense, young stands which are managed and maintained for the extraction of forest products. Stands are typically established with mechanical planting, but may also be established through other means. 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 on most timberlands. In North and South Carolina, pine straw is commonly harvested from these forests. This association does not include natural or near-natural *Pinus palustris* forests that retain some natural ground layer components and that will be managed for restoration of a natural longleaf pine community even though the *Pinus palustris* may have been planted.

Environment: No information

Vegetation: This alliance includes young, monospecific plantation stands of *Pinus palustris*. In most cases these stands support almost no other tree species in the overstory, and typically very little understory.

Dynamics: Most stands in this alliance are created after clear-cutting of natural stands and mechanical site preparation to reduce or eliminate competition for planted pine seedlings. Dense planting in rows, if successful, tends to result in nearly complete canopy closure which persists until the stand has been "thinned" twice, at which time some openings in the canopy are created which may allow some sunlight to the ground layer. 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.

Similar Associations:

Related Concepts: No information

Classification Comments:

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 in Alabama, Florida, Georgia, Louisiana, Mississippi, North Carolina, South Carolina, and Texas.

Subnations: AL, FL, GA, LA, MS, NC, SC, TX

TNC Ecoregions: 40:C, 41:C, 43:P, 50:P, 53:C, 55:P, 56:P, 57:P

USFS Ecoregions: 231Ca:PPP, 231Cd:PPP, 232Bq:CCC, 232Br:CCC, 232Ca:CCC, 232Cb:CCC, 232F:CC

Federal Lands: DOD (Fort Benning, Fort Bragg, Fort Gordon, Fort Stewart); DOE (Savannah River Site); USFS (Angelina, Apalachicola, Bankhead?, Croatan?, Francis Marion, Kisatchie, Ocala?, Osceola, Sabine NF, Sumter?, Talladega?, Tuskegee?)

ELEMENT SOURCES

References: Southeastern Ecology Working Group n.d.

TURKEY OAK / (COMMON BROOMSEDGE, THREE-AWN SPECIES, LITTLE BLUESTEM) WOODLAND

ELEMENT IDENTIFIERS

NVC association: *Quercus laevis* / (*Andropogon virginicus*, *Aristida* spp., *Schizachyrium scoparium*) Woodland

Database Code: CEG004689

Formation: Cold-deciduous woodland (II.B.2.N.a)

Alliance: *Quercus laevis* Woodland Alliance (A.617)

ELEMENT CONCEPT

Summary: This association includes *Quercus laevis*-dominated vegetation on deep sandy soils of the southeastern Coastal Plain. These stands most often occur where *Pinus palustris* has been removed and/or failed to regenerate due to fire suppression or other environmental modifications, including turpentine and logging. The typically open canopy of stands of this vegetation type may have minor amounts of relict or regenerating *Pinus palustris* present. However, canopy closure of some examples may exceed 60%. The relative density and diversity of the shrub and herb layers will vary with degree of fire suppression; the local expression will vary with latitude and the distributions of various shrub and herbaceous components, as well as with soil texture. Typical herbs are indicative of very dry or xeric moisture conditions, such as *Cnidocolus stimulosus*, *Pityopsis graminifolia*, and *Callisia graminea*. *Cladonia* and *Cladina* spp. may be prominent in many examples.

Environment: This vegetation type includes modified and/or fire-suppressed examples of *Pinus palustris* - *Quercus* spp.-dominated vegetation, where *Pinus palustris* has been removed and/or failed to regenerate due to fire suppression or other environmental modifications, including turpentine and logging.

Vegetation: The ground layer may contain a range of species given the fairly wide geographic range of this type. Grasses may include *Aristida lanosa*, *Aristida stricta* (within its range), *Aristida beyrichiana* (within its range), *Andropogon virginicus*, or *Schizachyrium scoparium*. Some other typical herbs may include *Cnidocolus stimulosus*, *Pityopsis graminifolia*, and *Callisia graminea*. *Cladonia* spp. may be a prominent component in sandhill examples.

Dynamics: No information

Similar Associations:

Related Concepts:

- Coastal Plain Sandhill Scrub/Scrub-Lichen Forest (Ambrose 1990a) ?
- IB7a. Southeastern Coastal Plain Turkey Oak Barrens (Allard 1990) ?
- Sandhills, Turkey Oak Phase (Monk 1968) ?
- Southern Scrub Oak: 72 (Eyre 1980) B

Classification Comments: This association was purposely created on parts of the Apalachicola National Forest years ago for "wildlife management" reasons in linear strips. In many cases these areas have better ground cover composition than adjacent pine stands which were heavily site prepped (causing heavy declines in herbaceous species) (R.E. Evans pers. obs.).

CONSERVATION RANKING & RARE SPECIES

GRank: GNA (modified/managed) (2000-7-2): This vegetation type includes modified and/or fire-suppressed examples of *Pinus palustris* - *Quercus* spp.-dominated vegetation, where *Pinus palustris* has been removed and/or failed to regenerate due to fire suppression or other environmental modifications, including turpentine and logging.

High-ranked species: No information

ELEMENT DISTRIBUTION

Range: This type ranges from the Florida parishes of Louisiana eastward through Florida, and into North Carolina and Virginia.

Subnations: AL, FL, GA, LA, MS, NC, SC, VA

TNC Ecoregions: 53:C, 56:C, 57:C

USFS Ecoregions: 232Bf:CCC, 232Bj:CCP, 232Bq:CCC, 232Br:CCC, 232Cb:CCC, 232Ch:CCC, 232D:CC

Federal Lands: DOD (Fort Benning, Fort Bragg, Fort Gordon, Fort Stewart); DOE (Savannah River Site); USFS (Apalachicola, Conecuh, Croatan, De Soto, Francis Marion, Homochitto?, Ocala, Talladega); USFWS (Carolina Sandhills)

ELEMENT SOURCES

References: Abrahamson et al. 1984, Allard 1990, Ambrose 1990a, Burns and Honkala 1990b, Eyre 1980, FNAI 1992a, Jones et al. 1981a, Monk 1968, Myers 1990, Rebertus et al. 1989, Schafale and Weakley 1990, Southeastern Ecology Working Group n.d., Weaver 1969, Wharton 1978, Workman 1982

ATLANTIC COASTAL PLAIN BLACKWATER STREAM FLOODPLAIN FOREST

BALD-CYPRESS - SWAMP BLACKGUM / WATER ASH / SHINING FETTERBUSH FOREST**ELEMENT IDENTIFIERS**

NVC association: *Taxodium distichum* - *Nyssa biflora* / *Fraxinus caroliniana* / *Lyonia lucida* Forest

Database Code: CEGLO04733

Formation: Seasonally flooded cold-deciduous forest (I.B.2.N.e)

Alliance: *Taxodium distichum* - *Nyssa (aquatica, biflora, ogeche)* Seasonally Flooded Forest Alliance (A.337)

ELEMENT CONCEPT

Summary: This forest type includes very wet forests of the southeastern Coastal Plain in North Carolina and South Carolina that are flooded by river overbank flow for long periods, and are dominated by combinations of *Nyssa biflora*, *Taxodium distichum*, and *Taxodium ascendens*. This community occurs along Coastal Plain streams which lack clay sediment, where *Nyssa aquatica* is not a significant component of the canopy. This community occurs in the most acidic and clay-free streams and consequently is found within coarse-sandy landscapes.

Environment: This community occurs along Coastal Plain streams which lack clay sediment, where *Nyssa aquatica* is not a significant component of the canopy. This community occurs in the most acidic and clay-free streams and consequently is found within coarse-sandy landscapes.

Vegetation: Stands are dominated by combinations of *Nyssa biflora*, *Taxodium distichum*, and *Taxodium ascendens*. *Nyssa aquatica* is not a significant component of the canopy.

Dynamics: No information

Similar Associations:

Related Concepts:

- Cypress--Gum Swamp (Acid Blackwater Subtype) (Schafale 2000) ?

Classification Comments:

CONSERVATION RANKING & RARE SPECIES

GRank: G3G4 (2001-1-31): This cypress-gum swamp occurs in the most acid landscapes of the southeastern Coastal Plain in North Carolina and South Carolina. There are over 20 occurrences recorded in North Carolina, totaling less than 10,000 acres, though additional occurrences exist. Nearly all examples have been altered by timber harvest, and many have also been altered by sedimentation and hydrologic changes to upstream areas in the watershed.

High-ranked species: No information

ELEMENT DISTRIBUTION

Range: This cypress-gum swamp occurs in the most acid landscapes of the southeastern Coastal Plain in North Carolina and South Carolina.

Subnations: NC, SC

TNC Ecoregions: 57:C

USFS Ecoregions: 232Bq:CCC, 232Bv:CCP, 232Ca:CCC, 232Cb:CCC, 232Ce:CCC

Federal Lands: DOD (Camp Lejeune, Camp MacKall); USFS (Croatan, Francis Marion)

ELEMENT SOURCES

References: Peet et al. unpubl. data 2002, Schafale 2000, Schafale and Weakley 1990, Schafale pers. comm., Southeastern Ecology Working Group n.d.

BALD-CYPRESS - WATER TUPELO - SWAMP BLACKGUM / WATER ASH / VIRGINIA-WILLOW FOREST**ELEMENT IDENTIFIERS**

NVC association: *Taxodium distichum* - *Nyssa aquatica* - *Nyssa biflora* / *Fraxinus caroliniana* / *Itea virginica* Forest

Database Code: CEGLO07432

Formation: Semipermanently flooded cold-deciduous forest (I.B.2.N.f)

Alliance: *Nyssa aquatica* - (*Taxodium distichum*) Semipermanently Flooded Forest Alliance (A.345)

ELEMENT CONCEPT

Summary: One type of small blackwater stream swamp forest of the Atlantic Coastal Plain, characteristically associated with ambiguously blackwater rivers. This type covers very wet forests that are flooded by river overbank flow for long periods and are dominated by combinations of *Nyssa aquatica*, *Nyssa biflora*, *Taxodium distichum*, and *Taxodium ascendens*. This type covers

examples along Coastal Plain streams in regions of fine-textured soils and examples in somewhat isolated basins of brownwater floodplains, where *Nyssa aquatica* and *Nyssa biflora* are both important components of the canopy. This forest is common along small rivers that arise in the Atlantic Coastal Plain (blackwater rivers) from Virginia to northern Florida. Dominant species, which account for at least 75% of the canopy cover, are *Taxodium distichum*, *Nyssa aquatica*, and *Nyssa biflora*. Other bottomland species often found in this community include *Acer rubrum*, *Liquidambar styraciflua*, and *Quercus laurifolia*. The shrub layer generally is open, and *Itea virginica* is common. The herbaceous layer is very sparse and limited to higher areas and tree bases. The dominant species in this stratum is *Phanopyrum gymnocarpon*; other typical species include *Boehmeria cylindrica*, *Saururus cernuus*, *Justicia ovata*, *Carex lupulina*, *Hydrocotyle verticillata*, *Mikania scandens*, *Spiranthes cernua*, *Asclepias perennis*, *Commelina virginica*, *Leersia lenticularis*, and others. Some stands may have a distinctive understory of *Arundinaria gigantea*. Soils are semipermanently flooded, and probability of annual flooding is 100%. More work needs to be done to understand the geographic variation in the type.

Environment: This association is one type of small blackwater stream swamp forest of the Atlantic Coastal Plain and is characteristically associated with ambiguously blackwater rivers. This type covers very wet forests that are flooded by river overbank flow for long periods. This type covers examples along Coastal Plain streams in regions of fine-textured soils and examples in somewhat isolated basins of brownwater floodplains. The soils are semipermanently flooded, and the probability of annual flooding is 100%. An occurrence is known from the Pungo soil series. More work needs to be done to understand the geographic variation in the type.

Vegetation: This type is dominated by combinations of *Nyssa aquatica*, *Nyssa biflora*, *Taxodium distichum*, and *Taxodium ascendens*; *Nyssa aquatica* and *Nyssa biflora* are both important components of the canopy. Dominant species, which account for at least 75% of the canopy cover, are *Taxodium distichum*, *Nyssa aquatica*, and *Nyssa biflora*. Other bottomland species often found in this community include *Acer rubrum*, *Liquidambar styraciflua*, and *Quercus laurifolia*. The shrub layer generally is open, and *Itea virginica* is common. The herbaceous layer is very sparse and limited to higher areas and tree bases. The dominant species in this stratum is *Phanopyrum gymnocarpon*; other typical species include *Boehmeria cylindrica*, *Saururus cernuus*, *Justicia ovata*, *Carex lupulina*, *Hydrocotyle verticillata*, *Mikania scandens*, *Spiranthes cernua*, *Asclepias perennis*, *Commelina virginica*, *Leersia lenticularis*, and others. Some stands may have a distinctive understory of *Arundinaria gigantea*.

Dynamics: The community experiences annual flooding. Exact successional dynamics of the community are not known, but with significant sediment deposition, bottomland hardwood communities possibly may develop.

Similar Associations:

- *Taxodium distichum* - (*Nyssa aquatica*) / *Forestiera acuminata* - *Planera aquatica* Forest (CEGL002421) -- is found in the floodplains of larger rivers.
- *Taxodium distichum* - *Nyssa aquatica* / *Fraxinus caroliniana* Forest (CEGL007431) -- is found in the floodplains of larger rivers.

Related Concepts:

- *Nyssa aquatica* - *Taxodium distichum* / *Fraxinus caroliniana* / *Triadenum walteri* Semipermanently Flooded Forest (Fleming 1998) ?
- Baldcypress - Tupelo: 102 (Eyre 1980) B
- Cypress--Gum Swamp (Intermediate Subtype) (Schafale 2000) ?
- IIA4c. Bald Cypress - Swamp Black Gum Swamp (Allard 1990) B
- Mesotrophic Semipermanently Flooded Forest (Rawinski 1992) B

Classification Comments: Although not included in the distribution of this type, vegetation with these nominals as dominants occurs in Arkansas (D. Zollner pers. comm.).

CONSERVATION RANKING & RARE SPECIES

GRank: G3G4 (1998-5-12): This community type is thought to be relatively secure globally, but the global status needs further assessment.

High-ranked species: *Cardamine longii* (G3), *Carex decomposita* (G3), *Lejeunea bermudiana* (G3G4)

ELEMENT DISTRIBUTION

Range: *Taxodium distichum* - *Nyssa aquatica* - *Nyssa biflora* / *Fraxinus caroliniana* / *Itea virginica* Forest is common along small rivers that arise in the Atlantic Coastal Plain (blackwater rivers) from Virginia to northern Florida.

Subnations: FL, GA, NC, SC, VA

TNC Ecoregions: 56:C, 57:C

USFS Ecoregions: 232Cb:CCC, 232Ce:CCC

Federal Lands: DOE (Savannah River Site); NPS (Congaree Swamp); USFS (Croatan, Francis Marion)

ELEMENT SOURCES

References: Allard 1990, Ambrose 1990a, Applequist 1959, Burdant et al. 1977, Burns and Honkala 1990a, Christensen 1988, Demaree 1932, Eyre 1980, FNAI 1992a, Fleming 1998, Fleming et al. 2001, Klawitter 1962, Martin et al. 1993, Mitsch and Gosselink 1986, Nelson 1986, Oberholster 1993, Peet et al. unpubl. data 2002, Penfound and Hall 1939, Radford and Martin 1975, Rawinski 1992, Schafale 2000, Schafale and Weakley 1990, Smith 1996a, Southeastern Ecology Working Group n.d., TNC 1998b, Wharton et al. 1982, Wieland 1994b, Zollner pers. comm.

POND-CYPRESS / (SWAMP BLACKGUM) / SWAMP DOGHOBBLE - SHINING FETTERBUSH - WAX-MYRTLE DEPRESSION FOREST

ELEMENT IDENTIFIERS

NVC association: *Taxodium ascendens* / (*Nyssa biflora*) / *Leucothoe racemosa* - *Lyonia lucida* - *Morella cerifera* Depression Forest

Database Code: CEGLO07420

Formation: Seasonally flooded cold-deciduous forest (I.B.2.N.e)

Alliance: *Taxodium ascendens* Seasonally Flooded Forest Alliance (A.336)

ELEMENT CONCEPT

Summary: This forested community occurs in poorly drained to permanently wet depressions surrounded by upland or saturated wetland communities, primarily pine flatwoods, but it rarely can occur in floodplain depressions of blackwater rivers (i.e., Styx River, Baldwin County, Alabama). Examples often have a characteristic dome-shaped appearance resulting from the largest, highest trees occurring in the center with smaller trees around the margins. It occurs in peaty depressions on the Coastal Plain from North Carolina and South Carolina through Georgia, Florida, Alabama, and Mississippi to eastern Louisiana. This community occurs on acidic sand overlain by an organic layer. Size ranges from one to several hundred acres. *Taxodium ascendens* is the most conspicuous tree in the canopy; *Pinus elliottii* var. *elliottii* can sometimes be present or codominant. *Nyssa biflora* frequently occurs in the subcanopy but may occur as a canopy species. Shrubs occur on hummocks which form around cypress buttresses and knees. This stratum may be made up of one or several species of *Leucothoe racemosa*, *Cyrilla racemiflora*, *Itea virginica*, *Lyonia lucida*, *Litsea aestivalis*, *Hypericum fasciculatum*, *Clethra alnifolia*, *Morella cerifera* (= *Myrica cerifera*), *Ilex cassine*, *Cephalanthus occidentalis*, *Persea palustris*, and more. Shrubs form a distinct understory with increasing distance from the center depression. *Carex* spp. and *Sphagnum* spp. occur on the thin, peaty muck. Other ground cover is scattered on hummocks, and includes *Woodwardia virginica*, *Saururus cernuus*, and *Lachnanthes caroliniana*. Density increases with proximity to the community's edge. *Pieris phillyreifolia*, an epiphytic shrub-vine may occur on the *Taxodium ascendens* trees, and *Tillandsia usneoides*, are often abundant in some parts of the range.

Environment: This forested community occurs in poorly drained to permanently wet depressions surrounded by upland or saturated wetland communities, primarily pine flatwoods, but it rarely can occur in floodplain depressions of blackwater rivers (i.e., Styx River, Baldwin County, Alabama) (NatureServe Ecology unpubl. data). Pools of stagnant acidic water stand in these depressions, with deepest water in the center (1-4 feet deep) and shallower near the margins. The outer edges of the community may dry down completely in the spring. Sites in north-central Florida are underlain by an impervious clay pan which impedes drainage and traps precipitation. It occurs on acidic sand overlain by an organic layer. Size ranges from one to several hundred acres (Monk and Brown 1965, Clewell 1971). Soil series in Florida can include Bladen, Coxville, Bayboro, Portsmouth, and Rutledge (Monk and Brown 1965).

Vegetation: *Taxodium ascendens* is the most conspicuous tree in the canopy. *Nyssa biflora* frequently occurs in the subcanopy (Monk and Brown 1965, Clewell 1971, 1981), but may occur as a canopy species. Shrubs occur on hummocks which form around cypress buttresses and knees. This stratum may be made up of one or several species of *Leucothoe racemosa*, *Cyrilla racemiflora*, *Itea virginica*, *Lyonia lucida*, *Hypericum fasciculatum*, *Clethra alnifolia*, *Morella cerifera* (= *Myrica cerifera*), *Ilex cassine*, *Cephalanthus occidentalis*, *Persea palustris*, and more. Shrubs form a distinct understory with increasing distance from the center depression (Monk and Brown 1965, Clewell 1971). *Carex* spp. and *Sphagnum* spp. occur on the thin, peaty muck. Other ground cover is scattered on hummocks, and includes *Woodwardia virginica*, *Saururus cernuus*, and *Lachnanthes caroliniana*. Density increases with proximity to the community's edge. *Pieris phillyreifolia*, an epiphytic shrub-vine may occur on the *Taxodium ascendens* trees, and *Tillandsia usneoides*, are often abundant in some parts of the range.

Dynamics: Species composition appears to be related to soil calcium and pH levels as well as maximum flooding. The importance of *Taxodium ascendens* increases with depth of flooding while *Pinus elliottii*, *Nyssa biflora*, *Acer rubrum*, and *Morella cerifera* decrease in importance; the reverse pattern seems to be true with increases in calcium levels (Monk and Brown 1965).

Likely due to the scarcity of undergrowth and inability to carry fire, fire is irregular - at least in the center - of this community (Clewell 1971, 1981). Wharton (1978) indicates this community has a 50- to 150-year fire interval, but that once a fire is started it can burn the peat for long periods (up to 50 years in the Okefenokee Swamp). Although the center of this community may have a fire interval of 100 to 150 years, the periphery burns much more frequently (3 to 5 years at outer edge) due to the shorter hydroperiod (FNAI 1990). Charcoal commonly found on *Taxodium ascendens* trunks indicates fires that burn through adjacent communities do reach the cypress. *Taxodium ascendens* can survive light fires, but peat fires can kill the trees.

Fire is an important determinant of successional dynamics and is in turn largely determined by hydroperiod. In the absence of occasional, light fire, this community may succeed to *Gordonia lasianthus* - *Magnolia virginiana* - *Persea palustris* / *Sphagnum* spp. Forest (CEGL007044) (Monk and Brown 1965, FNAI 1990). When peat fires occur, this community may be transformed to a treeless pond. One theory links the successional status of this community to that of *Nyssa biflora* / *Itea virginica* - *Cephalanthus occidentalis* Depression Forest (CEGL007434); calcium favors the growth of *Nyssa biflora* over that of *Taxodium ascendens*, and the *Nyssa biflora* itself acts as a calcium pump, thus generating a positive feedback that favors the swamp tupelo-dominated community

(Clewell 1971). This *Nyssa biflora*-dominated community also occurs in depressions with longer, and/or less fluctuating, hydroperiods. Some *Nyssa biflora*-dominated and codominated swamps may be the result of past cypress logging.

Similar Associations:

- *Taxodium ascendens* / *Ilex myrtifolia* / *Carex (striata, turgescens)* Stringer Forest (CEGL007419) -- occurs in and along diffuse waterways, is less acidic, and experiences fire more frequently.

Related Concepts:

- Cypress Pond (Wharton 1978) ?
- Forest, Cypress/Gum Pond (Ambrose 1990a) B
- IIA3a. Pondcypress Dome and Swamp Forest (Allard 1990) ?
- Nonriverine Swamp Forest (Oberholster 1993) ?
- Pondcypress (23) (USFS 1988) ?
- Pondcypress: 100 (Eyre 1980) B
- Small Depression Swamp (Mixed Subtype) (Schafale 2000) ?

Classification Comments:

CONSERVATION RANKING & RARE SPECIES

GRank: G3 (2001-1-23): This community is fairly widespread in occurrence in the East Gulf Coastal Plain, Florida Peninsula, and southern Atlantic Coastal Plain. It occurs in what were historically fire-maintained landscapes, and most occurrences nowadays have fire-suppressed conditions. Additionally, as a community which occurred in longleaf pine flatwood landscapes, this community has suffered from the extreme reduction in longleaf and associated communities.

High-ranked species: *Litsea aestivalis* (G3), *Pieris phyllireifolia* (G3)

ELEMENT DISTRIBUTION

Range: This community occurs in peaty depressions on the Coastal Plain from North Carolina and South Carolina through Georgia, Florida, Alabama, and Mississippi to eastern Louisiana.

Subnations: AL, FL, GA, LA, MS, NC, SC

TNC Ecoregions: 53:C, 55:C, 56:C, 57:C

USFS Ecoregions: 232Bf:CCC, 232Ca:CCC, 232Cb:CCC, 232Ce:CCC, 232Dc:CCC

Federal Lands: USFS (Apalachicola, Conecuh, De Soto, Francis Marion, Ocala, Osceola)

ELEMENT SOURCES

References: Allard 1990, Ambrose 1990a, Clewll 1971, Clewll 1981, Eyre 1980, FNAI 1990, FNAI 1992b, Monk and Brown 1965, NatureServe Ecology - Southeastern U.S. unpubl. data, Nelson 1986, Oberholster 1993, Schafale 2000, Schafale and Weakley 1990, Smith 1994a, Southeastern Ecology Working Group n.d., USFS 1988, Wharton 1978, Wharton et al. 1976

SWAMP BLACKGUM - TULIPTREE - (POND PINE, LOBLOLLY PINE) / SHINING FETTERBUSH - LITTLE GALLBERRY FOREST

ELEMENT IDENTIFIERS

NVC association: *Nyssa biflora* - *Liriodendron tulipifera* - *Pinus (serotina, taeda)* / *Lyonia lucida* - *Ilex glabra* Forest

Database Code: CEGL004734

Formation: Saturated cold-deciduous forest (I.B.2.N.g)

Alliance: *Nyssa biflora* - *Acer rubrum* - (*Liriodendron tulipifera*) Saturated Forest Alliance (A.351)

ELEMENT CONCEPT

Summary: This streamhead swamp forest type includes very wet forests along mucky small streams in sandy terrain, which are dominated by combinations of *Nyssa biflora*, *Acer rubrum* var. *rubrum*, and *Liriodendron tulipifera* and have undergrowth of pocosin species. Pines (*Pinus serotina*, *Pinus taeda*) are usually present but do not dominate. In the Francis Marion National Forest, South Carolina, the understory is dominated by *Acer rubrum* and *Persea palustris*. Prominent shrubs include *Ilex glabra*, *Lyonia lucida*, *Clethra alnifolia*, and *Morella caroliniensis*. *Smilax laurifolia* is a prominent vine. The herb layer is dominated by *Osmunda cinnamomea* and *Carex elliotii*. Though flooded occasionally by stream water, stands are also kept saturated by seepage input.

Environment: These are very wet forests along mucky small streams in sandy terrain. The habitat of this association is flooded occasionally by stream water, but is primarily kept saturated by seepage input.

Vegetation: A stand in the Francis Marion National Forest, South Carolina, attributed to this association has a canopy dominated by *Nyssa biflora*, *Liriodendron tulipifera*, and *Pinus taeda*. The understory is dominated by *Acer rubrum* and *Persea palustris*. Prominent shrubs include *Ilex glabra*, *Lyonia lucida*, *Clethra alnifolia*, and *Morella caroliniensis*. *Smilax laurifolia* is a prominent vine. The herb layer is dominated by *Osmunda cinnamomea* and *Carex elliotii*. Other herbs include *Andropogon glomeratus* var. *hirsutior*, *Dichanthelium dichotomum*, *Eleocharis tortilis*, *Osmunda regalis* var. *spectabilis*, *Platanthera clavellata*, *Platanthera lacera*, *Rhynchospora cephalantha* (= var. *attenuata*), and *Woodwardia areolata*.

Dynamics: No information

Similar Associations:

Related Concepts:

- Sandhill Streamhead Swamp (Schafale 2000) ?

Classification Comments: Some examples may exhibit dominance by *Carex elliotii* (Glitzenstein and Streng 2004).

CONSERVATION RANKING & RARE SPECIES

GRank: G3? (2001-1-31): This community occurs in the Fall-line Sandhills region of North Carolina and South Carolina, and may occur locally in other parts of the Coastal Plain with relatively high relief of sandy soils. Within that region, this type is locally fairly common. Examples are of moderate size. Landscape integrity is generally fairly high, though all examples have likely been subjected to timber removal. Fire may play some role in these forests as well, creeping in from surrounding uplands in drought conditions

High-ranked species: No information

ELEMENT DISTRIBUTION

Range: This community occurs in the Fall-line Sandhills region of North Carolina and South Carolina, and may occur locally in other parts of the Coastal Plain with relatively high relief of sandy soils.

Subnations: NC, SC

TNC Ecoregions: 56:P, 57:C

USFS Ecoregions: 232Bq:CCC, 232Ca:CCP, 232Cb:CCC, 232Ce:CCC

Federal Lands: DOD (Fort Bragg, Fort Gordon?, Fort Jackson?); USFS (Francis Marion); USFWS (Carolina Sandhills)

ELEMENT SOURCES

References: Glitzenstein and Streng 2004, NatureServe Ecology - Southeastern U.S. unpubl. data, Schafale 2000, Schafale and Weakley 1990, Schafale pers. comm., Southeastern Ecology Working Group n.d.

ATLANTIC COASTAL PLAIN CENTRAL FRESH-OLIGOHALINE TIDAL MARSH**INDIAN WILD RICE TIDAL HERBACEOUS VEGETATION**

ELEMENT IDENTIFIERS

NVC association: *Zizania aquatica* Tidal Herbaceous Vegetation

Database Code: CEGLO04202

Formation: Tidal temperate or subpolar grassland (V.A.5.N.n)

Alliance: *Zizania aquatica* Tidal Herbaceous Alliance (A.1484)

ELEMENT CONCEPT

Summary: This is a freshwater tidal marsh characterized by *Zizania aquatica* that occurs in oligohaline zones of tidal rivers along the north and mid-Atlantic coast of North America. These marshes occur in the lower reaches of freshwater tidal systems, in fresh to slightly brackish areas along flats that are infrequently exposed at very low tides. Soils are highly variable and are composed of varying amounts of silts, silty mucks, fine peat, to very coarse sands. *Zizania aquatica* is dominant, although only conspicuously so in mid to late summer, when it overtops early season vegetation. This community can be codominated by species such as *Pontederia cordata*, *Peltandra virginica*, *Polygonum arifolium*, *Polygonum punctatum*, and/or *Bidens* spp. Common associates are generally a mixture of freshwater and brackish species and can include *Sagittaria latifolia*, *Ludwigia palustris*, *Impatiens capensis*, *Leersia oryzoides*, *Amaranthus cannabinus*, *Hibiscus moscheutos*, *Sium suave*, *Acorus americanus*, and *Schoenoplectus fluviatilis*. This vegetation provides an important food source for migratory birds.

Environment: This association occurs in the lower reaches of freshwater tidal marshes, in fresh to slightly brackish areas that are low within the marsh and are infrequently exposed at lowest tides. It occurs on alluvial soils that are commonly silts or silty clays, although occasionally have a greater sand component. *Zizania* flats are best developed in quiet waters conducive to sedimentation (Barrett 1989).

Vegetation: This freshwater tidal marsh community can be highly variable in species composition, but characterized by *Zizania aquatica*, which is dominant and monotypic in some examples or codominant with such species as *Pontederia cordata*, *Peltandra virginica*, *Polygonum arifolium*, *Polygonum punctatum*, and/or *Bidens* spp., among others. Common associates are generally a mixture of freshwater and brackish species and can include *Sagittaria latifolia*, *Ludwigia palustris*, *Impatiens capensis*, *Leersia oryzoides*, *Amaranthus cannabinus*, *Hibiscus moscheutos*, *Sium suave*, *Acorus americanus*, and *Schoenoplectus fluviatilis*. *Nuphar lutea ssp. advena* is a common associate in the southern portion of the range. This plant association shows extreme seasonal variability with *Zizania aquatica* becoming a conspicuous component only in mid to late summer and generally senescing by mid to late autumn. This vegetation provides an important food source for migratory birds.

Dynamics: Freshwater tidal marshes are naturally dynamic systems that are best developed where there is a major input of freshwater, a daily tidal range of at least 0.5 m, and a geomorphology that tends to constrict and magnify tidal influence in the upper reaches of the estuary (Odum et al. 1984). They are subject to diurnal flooding by tides and seasonal and episodic flooding from river discharge. Plant composition of freshwater tidal marshes generally occurs as a mosaic of patches dominated by a few or a single species. Species composition is determined by species life history characteristics, especially lifeform, phenology and mode of

regeneration in response to microhabitat conditions, and the frequency and duration of flooding. Plant composition has seasonal variation.

Landward, this community can grade into other freshwater tidal marsh associations, especially *Peltandra virginica* - *Pontederia cordata* Tidal Herbaceous Vegetation (CEGL004706), and it can grade into tidal shrublands, like *Alnus serrulata* / (*Zizania aquatica*, *Zizaniopsis miliacea*) Shrubland (CEGL004627) in Virginia. Seaward, this association grades into *Nuphar lutea* ssp. *advena* Tidal Herbaceous Vegetation (CEGL004472).

Similar Associations:

- *Zizania (aquatica, palustris)* Herbaceous Vegetation (CEGL002382)

Related Concepts:

- *Zizania aquatica* - *Polygonum punctatum* Tidal Herbaceous Vegetation (Coulling 2002) ?
- *Zizania aquatica* marsh community (Barrett 1989) ?
- FW Tidal Marsh (Rawinski 1984) ?
- Freshwater Tidal Marsh: Wild Rice - Smartweed Type (McCoy and Fleming 2000) ?
- Freshwater tidal marsh complex, midtidal zone (Breden 1989) ?
- Tidal Freshwater Marsh (Wild Rice Subtype) (Schafale 2000) ?
- Wild Rice Community Type (Odum et al. 1984) ?

Classification Comments:

CONSERVATION RANKING & RARE SPECIES

GRank: G4? (1997-8-13): No information

High-ranked species: No information

ELEMENT DISTRIBUTION

Range: This association occurs along the Atlantic Coastal Plain from Maine and Massachusetts south to South Carolina, possibly extending into Georgia.

Subnations: CT, DE, FL?, GA?, MA, MD, ME, MS, NC, NJ, NY, RI, SC, VA

TNC Ecoregions: 56:P, 57:C, 58:C, 61:C, 62:C

USFS Ecoregions: 221Ab:CCC, 221Ad:CCC, 221Af:CCC, 221Ag:CCC, 232Ab:CCC, 232Ad:CCC, 232Br:CCC, 232Bt:CCC, 232Bx:CCC, 232Bz:CCC, 232Cb:CCP, 232Ce:CCC, 232Ch:CCP, 232Ci:CCP, 232Cj:CCP

Federal Lands: NPS (Cape Cod); USFS (Croaton, Francis Marion)

ELEMENT SOURCES

References: Barrett 1989, Barrett 1994, Bowman 2000, Breden 1989, Breden et al. 2001, Coulling 2002, Eastern Ecology Working Group n.d., Edinger et al. 2002, Enser 1999, Ferren and Good 1977, Fleming et al. 2001, Gawler 2001, Gawler 2002, Glitzenstein and Streng 2004, Good and Good 1975b, Harrison 2001, McCormick and Ashbaugh 1972, McCormick et al. 1970, McCoy and Fleming 2000, Metzler and Barrett 2001, Metzler and Rosza 1982, Odum et al. 1984, Rawinski 1984, Reschke 1990, Schafale 2000, Schafale and Weakley 1990, Swain and Kearsley 2001, Wharton 1978

ATLANTIC COASTAL PLAIN CENTRAL MARITIME FOREST

LIVE OAK - (SLASH PINE, CABBAGE PALMETTO) / REDBAY - BEAUTYBERRY FOREST

ELEMENT IDENTIFIERS

NVC association: *Quercus virginiana* - (*Pinus elliotii* var. *elliotii*, *Sabal palmetto*) / *Persea borbonia* - *Callicarpa americana* Forest

Database Code: CEGL007032

Formation: Lowland temperate seasonal evergreen forest (I.A.4.N.a)

Alliance: *Quercus virginiana* - (*Sabal palmetto*) Forest Alliance (A.55)

ELEMENT CONCEPT

Summary: This forest of barrier islands and related habitats has a low to moderately high tree canopy, often stunted and pruned by salt spray into streamlined shapes. The canopy is mostly closed with well-developed subcanopy and shrub layers and a sparse herb layer. Along the seaward edge of this community, the canopy tends to be quite low in stature with shrub species grading smoothly into the dominant canopy species. Vines are often an important component. This community ranges from Smith Island complex, Brunswick County, North Carolina, south to mid-peninsula, Atlantic Coast Florida (Cape Canaveral); the concept also includes temperate maritime hammocks of the northeastern and Panhandle coasts of Florida. The species composition varies along a latitudinal gradient throughout the geographic limits of its range. In general, from Cape Fear, North Carolina (Bald Head Island), south to mid-South Carolina, the canopy is dominated by *Quercus virginiana* and *Pinus taeda* occurring with *Sabal palmetto*. Farther south, *Pinus elliotii* var. *elliotii* replaces *Pinus taeda*, and *Sabal palmetto* becomes more prominent. Some floristic elements of the Georgia

islands, such as *Lyonia ferruginea* and *Forestiera segregata*, are completely absent from barrier islands in the Carolinas. *Serenoa repens* does not occur on the North Carolina barrier islands. This association has been found along the St. Johns River in Florida on the Ocala National Forest, far upstream from brackish water influence. In mid-Florida, tropical species begin to dominate the understory while temperate species retain canopy dominance. South of Martin County, Florida, tropical species such as *Bursera simaruba*, *Sideroxylon foetidissimum*, and *Ficus aurea* begin to dominate the forest canopy and mark the northern limits of the Tropical Barrier Island Forest community.

Environment: This community is found on xeric to mesic sites within the range described, often occurring as linear strands behind frontal dunes. The seaward edge of this vegetation is generally found on the leeward side of dune complexes which are capable of providing shelter from excessive salt spray and overwash. The interior of this community occurs on top of relict dune ridges and other areas with xeric to mesic hydrology.

The soils of these forests are generally poorly developed, sandy soils, low in natural fertility and organic matter content. In the northern portion of this community's range, siliceous sands dominate with little in the way of carbonate sands present. Further south, the carbonate fraction increases. In the deep south, and especially along the coast of Florida, carbonate sands begin to dominate. In terms of nutrients, siliceous sands are quite poor while carbonate sands are somewhat richer. Barrier island soils are derived from material carried onto the island by water and wave action and not from weathering of rock. The major input of nutrients to the terrestrial vegetation is from salt spray and precipitation (Godfrey 1976).

Vegetation: This forest has a low to moderately high tree canopy, often stunted and pruned by salt spray into streamlined shapes. The canopy is mostly closed with well-developed subcanopy and shrub layers and a sparse herb layer. The canopy along the seaward edge of this community tends to be quite low in stature with shrub species grading smoothly into the dominant canopy species. Vines are often an important component of this community. Species that may be found in the canopy, subcanopy or shrub layers include *Quercus virginiana*, *Sabal palmetto*, *Pinus elliotii* var. *elliotii*, *Pinus taeda*, *Magnolia grandiflora*, *Persea borbonia*, *Quercus hemisphaerica*, *Quercus nigra*, *Quercus phellos*, *Magnolia virginiana*, *Acer rubrum* var. *drummondii*, *Liquidambar styraciflua*, *Juniperus virginiana* var. *silicicola*, *Celtis laevigata*, *Morella cerifera* (= *Myrica cerifera*), *Ilex vomitoria*, *Osmanthus americanus* var. *americanus*, *Sabal minor*, *Serenoa repens*, *Ilex opaca* var. *opaca*, *Carpinus caroliniana* ssp. *caroliniana*, *Cornus florida*, *Prunus caroliniana*, *Zanthoxylum clava-herculis*, *Callicarpa americana*, *Baccharis halimifolia*, *Baccharis angustifolia*, *Lyonia lucida*, *Sageretia minutiflora*, *Sideroxylon tenax*, *Vaccinium arboreum*, *Forestiera segregata*, and *Opuntia humifusa* var. *humifusa*. Typical vines and herbaceous species include *Toxicodendron radicans*, *Smilax* spp., *Vitis rotundifolia*, *Parthenocissus quinquefolia*, *Houstonia procumbens*, *Bignonia capreolata*, *Mitchella repens*, *Berchemia scandens*, *Ampelopsis arborea*, *Oplismenus hirtellus* ssp. *setarius* (= *Oplismenus setarius*), *Boehmeria cylindrica*, *Galium pilosum*, *Dichantherium commutatum*, *Elephantopus nudatus*, *Passiflora incarnata*, *Passiflora lutea*, *Scleria triglomerata*, *Piptochaetium avenaceum*, *Panicum* spp., *Chasmanthium laxum*, *Juncus* spp., *Asplenium platyneuron* var. *bacculum-rubrum*, *Osmunda cinnamomea*, and *Woodwardia virginica*. In general, from Cape Fear, North Carolina, south to mid-South Carolina, the canopy is dominated by *Quercus virginiana* and *Pinus taeda* occurring with *Sabal palmetto*. Farther south, *Pinus elliotii* var. *elliotii* replaces *Pinus taeda*, and *Sabal palmetto* becomes more prominent. Some floristic elements of the Georgia islands, such as *Lyonia ferruginea* and *Forestiera segregata*, are completely absent from barrier islands in the Carolinas. *Serenoa repens* does not occur on the North Carolina barrier islands. In mid-Florida, tropical species begin to dominate the understory while temperate species retain canopy dominance. South of Martin County, Florida, tropical species such as *Bursera simaruba*, *Sideroxylon foetidissimum*, and *Ficus aurea* begin to dominate the forest canopy and mark the northern limits of the Tropical Barrier Island Forest community. At the northern limit of the range of this type, *Persea palustris* may replace *Persea borbonia*.

Dynamics: No information

Similar Associations:

- *Quercus virginiana* - *Quercus hemisphaerica* - *Pinus taeda* / *Persea (borbonia, palustris)* - *Ilex vomitoria* Forest (CEGL007027) -- found to the north of CEGL007032 with some minor overlap in range.

Related Concepts:

- IA9d. South Atlantic Barrier Island Forest (Allard 1990) ?
- Interdune Forest (Ambrose 1990a) B
- Maritime Strand Forest (Ambrose 1990a) B
- Oak-Magnolia forest (Sharitz 1975) ?

Classification Comments: Sharitz (1975) reports "Palmetto forest" on Kiawah Island, South Carolina, dominated by *Sabal palmetto* and *Quercus hemisphaerica*, with *Pinus palustris*, *Pinus taeda*, *Juniperus virginiana* var. *silicicola*, *Magnolia grandiflora*, and *Morella cerifera* (= *Myrica cerifera*). The open understory is dominated by *Ilex vomitoria*. In terms of dominant species, this community is very similar to the inland maritime forests of the South Atlantic but differs by its occurrence on outer barrier islands, its younger soils, and by its relatively low species richness. Similar communities occur on the mid-Atlantic and Gulf coasts. They may be distinguished by their geographic location and the resulting differences in species composition. On Kiawah Island, South Carolina, *Magnolia grandiflora* may be codominant in the canopy. *Pinus taeda*, *Pinus palustris*, and *Sabal palmetto* may also be present; *Ilex vomitoria* and *Persea borbonia* dominate the understory; *Vaccinium* sp. and *Crataegus* sp. are also present (Sharitz 1975). On nearby Seabrook Island, this forest type (or a slightly more inland variant) is found on ancient relictual dunes and additionally contains *Carya*

sp. and *Ulmus* sp. (*Ulmus floridana*) in the canopy; *Liquidambar styraciflua* and *Acer rubrum* in the subcanopy (E. Harrison pers. comm.).

CONSERVATION RANKING & RARE SPECIES

GRank: G2 (1997-12-31): This maritime forest association has a low to moderately high tree canopy, often stunted and pruned by salt spray into streamlined shapes. This community is found on xeric to mesic sites from Brunswick County, North Carolina, south to mid-peninsula Atlantic Coast Florida (Cape Canaveral). It often occurs as linear strands behind frontal dunes. The seaward edge of this vegetation is generally found on the leeward side of dune complexes which are capable of providing shelter from excessive salt spray and overwash. The interior of this community occurs on top of relict dune ridges and other areas with xeric to mesic hydrology. The composition varies along a latitudinal gradient throughout the geographic limits of its range. This community has a restricted range, and much of it has been lost as the result of human activity. Historically, animal grazing, land clearing, and fire had significant impacts on barrier island vegetation. However, the greatest damage to this vegetation has occurred in more recent years with the development of summer residences and cities on barrier islands. Many remaining occurrences have been fragmented, and their long-term viability is now questionable, since disturbance of the stream-lined canopy profile can result in overexposure of interior trees and branches to the deleterious effects of salt spray. Such exposure can result in canopy die-back and a shift in the floristic composition of the forest. The exotic *Triadica sebifera* has successfully established in many occurrences of this community.

High-ranked species: *Agrimonia incisa* (G3), *Sideroxylon tenax* (G3?)

ELEMENT DISTRIBUTION

Range: This community ranges from Smith Island complex, Brunswick County, North Carolina, south to mid-peninsula, Atlantic Coast Florida (Cape Canaveral); the concept also includes temperate maritime hammocks of the northeastern and Panhandle coasts of Florida.

Subnations: AL, FL, GA, MS?, NC, SC

TNC Ecoregions: 53:C, 55:C, 56:C, 57:C

USFS Ecoregions: 232Ce:CCC, 232Ci:CCC, 232Dc:CCC, 232Gb:CCC

Federal Lands: NPS (Cumberland Island?, Fort Pulaski); USFS (Francis Marion, Ocala); USFWS (Bon Secour, Cape Romain, Lake Woodruff?)

ELEMENT SOURCES

References: Allard 1990, Ambrose 1990a, Aulbach-Smith 1984, Bozeman 1975, FNAI 1992a, Gaddy 1981, Godfrey 1976, Hardin 1990, Harrison pers. comm., Hillestad et al. 1975, Johnson et al. 1990b, Nelson 1986, Peet et al. unpubl. data 2002, Rayner 1984, Rayner and Batson 1976, Sandifer et al. 1980, Schafale and Weakley 1990, Sharitz 1975, Soil Conservation Service 1980, Soil Conservation Service 1982, South Carolina Wildlife and Marine Resources Department 1984, Southeastern Ecology Working Group n.d., Wharton 1978

ATLANTIC COASTAL PLAIN CLAY-BASED CAROLINA BAY WETLAND

POND-CYPRESS / MAIDENCANE - TALL PINEBARREN MILKWORT WOODLAND

ELEMENT IDENTIFIERS

NVC association: *Taxodium ascendens* / *Panicum hemitomon* - *Polygala cymosa* Woodland

Database Code: CEGLO03733

Formation: Seasonally flooded cold-deciduous woodland (II.B.2.N.c)

Alliance: *Taxodium ascendens* Seasonally Flooded Woodland Alliance (A.651)

ELEMENT CONCEPT

Summary: This community type occurs in seasonally flooded depression wetlands, especially in clay-based Carolina bays. The canopy is open (to closed, or scattered) and dominated by *Taxodium ascendens*. The herbaceous stratum is normally dense, and extremely variable in dominance from site to site, spatially within each site, and from year to year (depending on hydrologic conditions). Typical dominants include *Panicum hemitomon*, *Panicum verrucosum*, *Panicum rigidulum* var. *combsii*, *Leersia hexandra*, *Rhynchospora filifolia*, *Rhynchospora perplexa*, *Rhynchospora careyana*, *Dichantherium erectifolium*, *Dichantherium wrightianum*, *Scleria georgiana*, *Scleria reticularis*, *Polygala cymosa*, *Boltonia asteroides*, *Eriocaulon compressum*, *Lachnanthes caroliniana*, *Eupatorium leucolepis*, *Pluchea rosea*, *Euthamia caroliniana*, *Rhexia aristosa*, and *Coelorachis rugosa*.

Environment: This community type occurs in seasonally flooded depression wetlands, especially in clay-based Carolina bays.

Vegetation: The canopy stratum ranges from scattered to closed, but is generally open (and even when closed, *Taxodium ascendens* canopy casts only moderate shade). *Taxodium ascendens* is the dominant, usually strongly so, but *Nyssa biflora* and *Liquidambar styraciflua* may also be present in the canopy or subcanopy. *Pinus taeda* has sometimes invaded, because of adjacent seed source and fire suppression, but was probably not a typical component of the community under pre-settlement conditions. The shrub layer is usually sparse, though occasionally *Ilex amelanchar* can be common. Most shrubs are restricted to rooting in cypress knotholes, stumps, and knees, and can include *Vaccinium formosum*, *Vaccinium fuscatum*, *Ilex glabra*, *Acer rubrum* var. *trilobum*, *Diospyros*

virginiana, *Liquidambar styraciflua*, *Smilax rotundifolia*, *Toxicodendron radicans* ssp. *radicans*, *Cyrilla racemiflora*, *Gaylussacia frondosa*, *Ilex opaca* var. *opaca*, *Morella cerifera*, *Rubus argutus*, and *Vitis rotundifolia* var. *rotundifolia*. The herbaceous stratum is normally dense, and extremely variable in dominance from site to site, spatially within each site, and from year to year (depending on hydrologic conditions). Typical dominants include *Panicum hemitomon*, *Panicum verrucosum*, *Panicum rigidulum* var. *combsii*, *Leersia hexandra*, *Rhynchospora filifolia*, *Rhynchospora perplexa*, *Rhynchospora careyana*, *Dichantheium erectifolium*, *Dichantheium wrightianum*, *Scleria georgiana*, *Scleria reticularis*, *Polygala cymosa*, *Boltonia asteroides*, *Eriocaulon compressum*, *Lachnanthes caroliniana*, *Eupatorium leucolepis*, *Pluchea rosea*, *Euthamia caroliniana*, *Rhexia aristosa*, and *Coelorachis rugosa*. Other species include *Agalinis linifolia*, *Bartonia paniculata*, *Centella erecta*, *Echinodorus tenellus*, *Eleocharis melanocarpa*, *Eleocharis tricostata*, *Gratiola ramosa*, *Hypericum denticulatum* (= var. *denticulatum*), *Hypericum gymnanthum*, *Lobelia boykinii*, *Lobelia nuttallii*, *Lycopus amplexans*, *Oxypolis canbyi*, *Pluchea camphorata*, *Proserpinaca pectinata*, *Saccharum giganteum*, *Saccharum* spp., *Sabatia difformis*, *Sagittaria isoetiformis*, *Sclerolepis uniflora*, *Symphotrichum dumosum*, *Viola lanceolata* ssp. *vittata*, and *Xyris* spp.

Dynamics: These communities were historically burned on an occasional basis, by fires which traveled through the matrix longleaf pine uplands and burned into and across the Carolina bays when conditions permitted (dry seasons).

Similar Associations:

Related Concepts:

- Small Depression Drawdown Meadow/Savanna (Typic Cypress Savanna Subtype) (Schafale 2000) ?

Classification Comments: Well-documented occurrences are known from Antioch Church Bay (Hoke County, North Carolina), Pretty Pond (Robeson County, North Carolina), and Goose Pond (Robeson County, North Carolina).

CONSERVATION RANKING & RARE SPECIES

GRank: G2G3 (2000-1-23): This community occurs in seasonally flooded Carolina bays and other isolated depressions (surrounded by uplands). Historically, occurrences of this community probably numbered in the thousands, with areas of individual occurrences ranging from 10-1000 hectares (24-2400 acres). Most historic occurrences have been converted to agriculture or intensive silviculture. The few examples that remain have mostly been degraded in various ways. Historically, the matrix in which these communities occurred was primarily upland longleaf pine communities, and periodic fires burned into these communities during dry periods. Now, nearly all examples are isolated from natural matrix and periodic fire, altering their hydrologic function, vegetation structure, and capability to serve as habitat for animal species which use them and surrounding habitats. For bays surrounded by agriculture, runoff of animal waste and crop fertilizers degrades their condition.

High-ranked species: *Lobelia boykinii* (G2G3), *Oxypolis canbyi* (G2), *Panicum hirtii* (G1), *Rhexia aristosa* (G3)

ELEMENT DISTRIBUTION

Range: This community is known from the inner and outer Coastal Plain of southern North Carolina, South Carolina, and (probably) Georgia.

Subnations: GA?, NC, SC

TNC Ecoregions: 56:C, 57:C

USFS Ecoregions: 232Bq:CCP, 232Bv:CCC, 232Cb:CCC, 232Ce:CCC

Federal Lands: USFS (Francis Marion)

ELEMENT SOURCES

References: Schafale 2000, Schafale and Weakley 1990, Southeastern Ecology Working Group n.d.

ATLANTIC COASTAL PLAIN NONRIVERINE SWAMP AND WET HARDWOOD FOREST

WATER TUPELO - SWAMP BLACKGUM FOREST

ELEMENT IDENTIFIERS

NVC association: *Nyssa aquatica* - *Nyssa biflora* Forest

Database Code: C EGL007429

Formation: Semipermanently flooded cold-deciduous forest (I.B.2.N.f)

Alliance: *Nyssa aquatica* - (*Taxodium distichum*) Semipermanently Flooded Forest Alliance (A.345)

ELEMENT CONCEPT

Summary: This forest, dominated by *Nyssa aquatica* and *Nyssa biflora* in varying proportions, is found along shallow borders of alluvial swamps and flats near uplands. It is a Zone II community. The range has not been completely assessed; it is theoretically possible on the Atlantic Coastal Plain from southeastern Virginia to southern Georgia, the Gulf Coastal Plain from about Tallahassee west to southeastern Texas, and the Mississippi Alluvial Plain to southern Arkansas and western Tennessee. *Taxodium distichum* may occur in the canopy of this community, but is not a dominant (usually less than 25% cover). Other tree canopy/subcanopy species are *Fraxinus pennsylvanica*, *Salix nigra*, *Populus heterophylla*, and *Carpinus caroliniana*. Other shrub and herbaceous species are

Leucothoe racemosa, *Cyrilla racemiflora*, *Planera aquatica*, and *Saururus cernuus*. *Decumaria barbara*, *Toxicodendron radicans*, *Ampelopsis arborea*, and *Bignonia capreolata* are commonly occurring vines, but have less than 10% cover.

Environment: This forest association is found along shallow borders of alluvial swamps and flats near uplands. Hydrologic regime is the most important environmental determinant of the distribution of this community. It occurs in Zone II (Wharton et al. 1982), and therefore probability of annual flooding is 100% and duration of flooding is approximately 100% of the growing season with soils nearly permanently saturated. The community occurs along shallow borders of alluvial swamps and flats near the uplands (Eyre 1980) and probably is found in less wet areas than swamp forests dominated by *Taxodium distichum* and *Nyssa aquatica*.

Vegetation: Stands of this forest are dominated by *Nyssa aquatica* and *Nyssa biflora* in varying proportions. *Taxodium distichum* may occur in the canopy of this community, but is not a dominant (usually less than 25% cover). Other tree canopy/subcanopy species are *Fraxinus pennsylvanica*, *Salix nigra*, *Populus heterophylla*, and *Carpinus caroliniana*. Other shrub and herbaceous species are *Leucothoe racemosa*, *Cyrilla racemiflora*, *Planera aquatica*, and *Saururus cernuus*. *Decumaria barbara*, *Toxicodendron radicans*, *Ampelopsis arborea*, and *Bignonia capreolata* are commonly occurring vines, but have less than 10% cover.

Dynamics: Probability of annual flooding is 100%, and duration of flooding is approximately 100% of the growing season with soils nearly permanently saturated. Seedlings of the dominant tree species are not shade-tolerant and require unflushed soil for germination. Successional relationships of this community to others is not clear, although with organic matter accumulation and soil buildup, this community may succeed to a bottomland hardwood type.

Similar Associations:

- *Taxodium distichum* - (*Nyssa aquatica*) / *Forestiera acuminata* - *Planera aquatica* Forest (CEGL002421) -- has only *Nyssa aquatica* and not *Nyssa biflora* and has *Taxodium distichum* as a dominant.

Related Concepts:

- Baldcypress-Water Tupelo Series (Diamond 1993) B
- IIA4d. Tupelo Swamp (Allard 1990) B
- P1B3dII3b. *Nyssa aquatica* - *Nyssa biflora* - *Taxodium distichum* (Foti et al. 1994) ?
- Tupelo Swamp (Oberholster 1993) B
- Water Tupelo - Swamp Tupelo: 103 (Eyre 1980) B

Classification Comments: Although swamp forests dominated by *Nyssa aquatica* and *Nyssa biflora* and lacking *Taxodium distichum* completely or as a dominant develop following logging, this community is naturally occurring. More work needs to understand the development of this community and to determine the extent of its geographic variation.

CONSERVATION RANKING & RARE SPECIES

GRank: G4G5 (1997-8-15): No information

High-ranked species: *Cardamine longii* (G3), *Carex decomposita* (G3), *Lejeunea bermudiana* (G3G4)

ELEMENT DISTRIBUTION

Range: The range has not been completely assessed; it is theoretically possible on the Atlantic Coastal Plain from southeastern Virginia to southern Georgia, the Gulf Coastal Plain from about Tallahassee west to southeastern Texas, and the Mississippi Alluvial Plain to southern Arkansas and presumably western Tennessee.

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

TNC Ecoregions: 40:C, 41:C, 42:C, 43:C, 53:C, 56:C, 57:C

USFS Ecoregions: 232:C, 234A:CC

Federal Lands: DOD (Fort Benning); DOE (Savannah River Site); USFS (Angelina?, Apalachicola, Francis Marion, Kisatchie, Sabine NF?); USFWS (Hatchie, Lower Hatchie?)

ELEMENT SOURCES

References: Allard 1990, Ambrose 1990a, Diamond 1993, Evans 1991, Eyre 1980, Fleming et al. 2001, Foti et al. 1994, Nelson 1986, Oberholster 1993, Schafale and Weakley 1990, Smith 1996a, Southeastern Ecology Working Group n.d., Wharton et al. 1982, Wieland 1994b, Wieland 2000b

ATLANTIC COASTAL PLAIN NORTHERN WET LONGLEAF PINE SAVANNA AND FLATWOODS

LONGLEAF PINE - POND PINE / CAROLINA DROPSEED - (CAROLINA WIREGRASS) - SAVANNA ERYNGO WOODLAND

ELEMENT IDENTIFIERS

NVC association: *Pinus palustris* - *Pinus serotina* / *Sporobolus pinetorum* - (*Aristida stricta*) - *Eryngium integrifolium* Woodland

Database Code: CEGL004501

Formation: Saturated temperate or subpolar needle-leaved evergreen woodland (II.A.4.N.f)

Alliance: *Pinus palustris* - *Pinus (elliottii, serotina)* Saturated Woodland Alliance (A.578)

ELEMENT CONCEPT

Summary: This saturated longleaf pine - pond pine woodland association is restricted to wet and moist Ultisols of the Atlantic Coastal Plain of North and South Carolina. The open canopy of this association is dominated by a combination of *Pinus palustris* and *Pinus serotina*. *Pinus taeda* may also be present. *Ilex glabra*, *Clethra alnifolia*, and *Gaylussacia frondosa* are common in the shrub layer. *Sporobolus pinetorum*, *Aristida stricta*, *Ctenium aromaticum*, and *Eryngium integrifolium* are in the herbaceous layer. *Sporobolus pinetorum* may dominate, with *Ctenium aromaticum* of secondary importance. Some stands in the wiregrass gap of South Carolina (e.g., Francis Marion National Forest) will not have *Aristida stricta* present.

Environment: No information

Vegetation: The open canopy of this association is dominated by a combination of *Pinus palustris* and *Pinus serotina*. *Pinus taeda* may also be present. *Ilex glabra*, *Clethra alnifolia*, and *Gaylussacia frondosa* are common in the shrub layer. *Sporobolus pinetorum*, *Aristida stricta*, *Ctenium aromaticum*, and *Eryngium integrifolium* are in the herbaceous layer. *Sporobolus pinetorum* may dominate, with *Ctenium aromaticum* of secondary importance. Some stands in the wiregrass gap of South Carolina (e.g., Francis Marion National Forest) will not have *Aristida stricta* present. Other shrub layer species that may occur commonly include *Magnolia virginiana*, *Quercus pumila*, *Symplocos tinctoria*, *Gaylussacia dumosa*, *Hypericum galioides*, *Hypericum crux-andreae*, *Vaccinium tenellum*, *Persea palustris*, *Morella carolinensis* (= *Myrica heterophylla*), *Lyonia mariana*, and sprouts of *Liquidambar styraciflua* and *Quercus phellos*. Common forbs may include *Solidago stricta*, *Chaptalia tomentosa*, *Carphephorus paniculatus*, *Carphephorus tomentosus*, *Lycopodiella alopecuroides*, *Rhexia petiolata*, *Helianthus heterophyllus*, *Helianthus angustifolius*, *Eupatorium leucolepis*, *Eupatorium rotundifolium*, *Hypericum setosum*, *Viola X primulifolia*, *Tephrosia hispidula*, *Lobelia nuttallii*, *Symphytotrichum walteri* (= *Aster walteri*), *Symphytotrichum dumosum* (= *Aster dumosus*), *Coreopsis major*, *Viola septemloba*, *Lespedeza capitata*, *Bigelovia nudata*, *Xyris caroliniana*, *Rhexia alifanus*, *Osmunda cinnamomea*, *Marshallia graminifolia*, *Desmodium tenuifolium*, *Sarracenia minor*, and many others. Graminoids may include *Scleria pauciflora* var. *caroliniana*, *Schizachyrium scoparium*, *Paspalum praecox*, *Saccharum brevibarbe* var. *contortum*, *Panicum virgatum*, *Gymnopogon brevifolius*, *Aristida purpurascens* var. *virgata* (= *Aristida virgata*), *Andropogon capillipes*, *Tridens ambiguus*, *Andropogon glomeratus* var. *hirsutior*, *Rhynchospora chapmanii*, *Panicum verrucosum*, *Panicum anceps* (= var. *rhizomatium*), *Chasmanthium laxum*, *Dichantherium consanguineum*, *Dichantherium dichotomum* var. *ensifolium* (= *Dichantherium ensifolium*), *Dichantherium strigosum* var. *leucoblepharis*, *Dichantherium dichotomum* var. *tenuis* (= *Dichantherium tenue*), and *Andropogon glaucopsis* (Glitzenstein and Streng 2004).

Dynamics: The maintenance of this vegetation type depends on frequent, low-intensity, growing-season fires to control understory vegetation and for the reproduction of *Pinus palustris* and *Pinus serotina*. The fires limit competition from hardwood trees and shrubs and help to maintain the high diversity of herbaceous vegetation (Glitzenstein et al. 2003).

Similar Associations:

Related Concepts:

- *Pinus palustris*-*Pinus taeda* / *Ilex glabra* / *Sporobolus pinetorum* Woodland (Glitzenstein and Streng 2004) =
- *Pinus palustris*-*Pinus taeda*-*Pinus serotina* / *Sporobolus pinetorum* Woodland (Glitzenstein and Streng 2004) =
- Pine Savanna, Wet Ultisol Variant (Schafale 1994) B
- Series 5, Type N (Peet 1996) ?
- Wet Loamy Pine Savanna (Schafale 2000) ?

Classification Comments: More information can be added from North Carolina Vegetation Survey data. See Glitzenstein and Streng (2004) description for *Pinus palustris*-*Pinus taeda* / *Ilex glabra* / *Sporobolus pinetorum* Woodland (also called *Pinus palustris*-*Pinus taeda*-*Pinus serotina* / *Sporobolus pinetorum* Woodland).

CONSERVATION RANKING & RARE SPECIES

GRank: G2 (1997-12-31): This saturated longleaf pine - pond pine woodland association is restricted both in range and in the substrate on which it occurs. It is only found on wet Ultisols of the Atlantic Coastal Plain of North and South Carolina, where it is naturally highly restricted to few occurrences of small acreage. This community is part of the endangered Longleaf Pine Ecosystem, which once dominated the Coastal Plain landscape of the southeastern United States, and depends on frequent, low-intensity, growing-season fires to control understory vegetation and for the reproduction of *Pinus palustris* and *Pinus serotina*. Saturated pine woodlands are susceptible to the effects of fire suppression, over-grazing, hydrologic alteration, or conversion to commercial forest plantations or agriculture. Remaining examples are highly threatened by development, conversion, and alteration of fire regimes. Most of those occurrences which have not been destroyed are severely degraded.

High-ranked species: *Sporobolus pinetorum* (G3)

ELEMENT DISTRIBUTION

Range: This association is only found on wet Ultisols of the Atlantic Coastal Plain of North and South Carolina, where it is naturally highly restricted to few occurrences of small acreage.

Subnations: NC, SC

TNC Ecoregions: 57:C

USFS Ecoregions: 232Cb:CCC

Federal Lands: USFS (Croatan, Francis Marion)

ELEMENT SOURCES

References: Glitzenstein and Streng 2004, NC Vegetation Survey - Southeast U.S. unpubl. data unpubl. data, Peet 1996, Peet et al. unpubl. data 2002, Schafale 1994, Schafale 2000, Schafale and Weakley 1990, Southeastern Ecology Working Group n.d.

LONGLEAF PINE - POND PINE / LONGLEAF THREE-AWN - YELLOW PITCHERPLANT WOODLAND

ELEMENT IDENTIFIERS

NVC association: *Pinus palustris* - *Pinus serotina* / *Aristida palustris* - *Sarracenia flava* Woodland

Database Code: CEGLO04498

Formation: Saturated temperate or subpolar needle-leaved evergreen woodland (II.A.4.N.f)

Alliance: *Pinus palustris* - *Pinus (elliottii, serotina)* Saturated Woodland Alliance (A.578)

ELEMENT CONCEPT

Summary: This saturated longleaf pine - pond pine woodland is found only in South Carolina, where it is restricted to wet swales. Stands are dominated by *Pinus palustris* and *Pinus serotina*. The herb layer is characterized by the presence or partial dominance of *Aristida palustris* and *Sarracenia flava*. Additional information is to be added from North Carolina Vegetation Survey data.

Environment: This saturated longleaf pine - pond pine association is found only in South Carolina, where it is restricted to wet swales.

Vegetation: Stands of this saturated longleaf pine - pond pine woodland are dominated by *Pinus palustris* and *Pinus serotina*. The herb layers is characterized by the presence or partial dominance of *Aristida palustris* and *Sarracenia flava*.

Dynamics: No information

Similar Associations:

- *Pinus palustris* - *Pinus serotina* / *Ctenium aromaticum* - *Scleria pauciflora* - *Sarracenia flava* Woodland (CEGL004499)

Related Concepts:

- *Pinus palustris* - *Pinus serotina* / *Aristida palustris (sic)* / *Sarracenia flava* Woodland (Peet 1996) ?

Classification Comments:

CONSERVATION RANKING & RARE SPECIES

GRank: G1 (1997-12-31): This saturated longleaf pine - pond pine association is found only in South Carolina, where it is a naturally rare type restricted to wet swales. It is part of the endangered Longleaf Pine Ecosystem, which once dominated the Coastal Plain landscape of the southeastern United States, and depends on frequent, low-intensity, growing-season fires to control understory vegetation and for the reproduction of *Pinus palustris* and *Pinus serotina*. Saturated pine woodlands are susceptible to the effects of fire suppression, over-grazing, hydrologic alteration, or conversion to commercial forest plantations or agriculture. Remaining examples are highly threatened by development, conversion, and alteration of fire regimes. Most of those occurrences which have not been destroyed are severely degraded.

High-ranked species: No information

ELEMENT DISTRIBUTION

Range: This woodland is found only in the Coastal Plain of South Carolina.

Subnations: SC

TNC Ecoregions: 56:P, 57:C

USFS Ecoregions: 232Ce:CCC

Federal Lands: USFS (Francis Marion)

ELEMENT SOURCES

References: NC Vegetation Survey - Southeast U.S. unpubl. data unpubl. data, Peet 1996, Peet et al. unpubl. data 2002, Southeastern Ecology Working Group n.d.

LONGLEAF PINE - POND PINE / TOOTHACHE GRASS - PAPILLOSE NUTRUSH - YELLOW PITCHERPLANT WOODLAND

ELEMENT IDENTIFIERS

NVC association: *Pinus palustris* - *Pinus serotina* / *Ctenium aromaticum* - *Scleria pauciflora* - *Sarracenia flava* Woodland

Database Code: CEGLO04499

Formation: Saturated temperate or subpolar needle-leaved evergreen woodland (II.A.4.N.f)

Alliance: *Pinus palustris* - *Pinus (elliottii, serotina)* Saturated Woodland Alliance (A.578)

ELEMENT CONCEPT

Summary: This saturated longleaf pine - pond pine woodland community occurs in the South Atlantic Coastal Plain of South Carolina. Stands are dominated by *Pinus palustris* and *Pinus serotina*. The herb layer is characterized by the presence or partial dominance of *Ctenium aromaticum*, *Scleria pauciflora*, and *Sarracenia flava*. More information to be added from North Carolina Vegetation Survey plot data.

Environment: No information

Vegetation: Stands of this saturated longleaf pine - pond pine woodland are dominated by *Pinus palustris* and *Pinus serotina*. The herb layer is characterized by the presence or partial dominance of *Ctenium aromaticum*, *Scleria pauciflora*, and *Sarracenia flava*.

Dynamics: No information

Similar Associations:

- *Pinus palustris* - *Pinus serotina* / *Aristida palustris* - *Sarracenia flava* Woodland (CEGL004498)

Related Concepts:

- *Pinus palustris* - *Pinus serotina* / *Ctenium aromaticum* - *Scleria pauciflora* - *Sarracenia flava* Woodland (Peet 1996) ?
- *Pinus palustris*-*Pinus serotina* / *Ctenium aromaticum*-*Muhlenbergia expansa*-*Andropogon perangustatus* Woodland (Glitzenstein and Streng 2004) =

Classification Comments:

CONSERVATION RANKING & RARE SPECIES

GRank: G1 (1997-12-31): This saturated longleaf pine - pond pine woodland association is restricted both in range and in the substrate on which it occurs, being found only in the Atlantic Coastal Plain of South Carolina. It is part of the endangered Longleaf Pine Ecosystem, which once dominated the Coastal Plain landscape of the southeastern United States, and depends on frequent, low-intensity, growing-season fires to control understory vegetation and for the reproduction of *Pinus palustris* and *Pinus serotina*. Saturated pine woodlands are susceptible to the effects of fire suppression, over-grazing, hydrologic alteration, or conversion to commercial forest plantations or agriculture. Remaining examples are highly threatened by development, conversion, and alteration of fire regimes. Most of those occurrences which have not been destroyed are severely degraded.

High-ranked species: No information

ELEMENT DISTRIBUTION

Range: This community occurs in the South Atlantic Coastal Plain of South Carolina.

Subnations: SC

TNC Ecoregions: 56:C, 57:C

USFS Ecoregions: 232C:CC

Federal Lands: USFS (Francis Marion)

ELEMENT SOURCES

References: NC Vegetation Survey - Southeast U.S. unpubl. data unpubl. data, Peet et al. unpubl. data 2002, Southeastern Ecology Working Group n.d.

LONGLEAF PINE - POND PINE / TOOTHACHE GRASS - SAVANNA HAIRGRASS - LARGE WHITETOP SEDGE WOODLAND

ELEMENT IDENTIFIERS

NVC association: *Pinus palustris* - *Pinus serotina* / *Ctenium aromaticum* - *Muhlenbergia expansa* - *Rhynchospora latifolia* Woodland

Database Code: CEGL003660

Formation: Saturated temperate or subpolar needle-leaved evergreen woodland (II.A.4.N.f)

Alliance: *Pinus palustris* - *Pinus (elliottii, serotina)* Saturated Woodland Alliance (A.578)

ELEMENT CONCEPT

Summary: This association is a saturated longleaf pine - pond pine woodland which is found on wet Ultisols of the Atlantic Coastal Plain. The open canopy is dominated by a mixture of *Pinus palustris* and *Pinus serotina*. The shrub layer is sparse to absent. Some characteristic components of the herbaceous stratum include *Ctenium aromaticum*, *Muhlenbergia expansa*, and *Rhynchospora latifolia*.

Environment: This saturated longleaf pine - pond pine woodland association is restricted to wet Ultisols of the Atlantic Coastal Plain from North Carolina to Florida.

Vegetation: The open canopy of this association is dominated by a mixture of *Pinus palustris* and *Pinus serotina*. The shrub layer is sparse to absent. Some characteristic components of the herbaceous stratum include *Ctenium aromaticum*, *Muhlenbergia expansa*, and *Rhynchospora latifolia*.

Dynamics: No information

Similar Associations:

- *Pinus palustris* - *Pinus serotina* / *Ctenium aromaticum* - *Muhlenbergia expansa* - *Carphephorus odoratissimus* Woodland (CEGL003658) -- is found on wet Spodosols rather than Ultisols.

Related Concepts:

- IIB1d. Atlantic Coastal Plain Wet Longleaf Pine Savanna (Allard 1990) B
- Pine Savanna, Wet Ultisol Variant (Schafale 1994) ?
- Wet Loamy Pine Savanna (Schafale 2000) ?

Classification Comments:

CONSERVATION RANKING & RARE SPECIES

GRank: G1 (1997-10-10): This saturated longleaf pine - pond pine woodland association is naturally rare, restricted both in range and in the substrate on which it occurs. It is only found in the Atlantic Coastal Plain from North Carolina to Florida, on wet Ultisols. It is part of the endangered Longleaf Pine Ecosystem, which once dominated the Coastal Plain landscape of the southeastern United States, and depends on frequent, low-intensity, growing-season fires to control understory vegetation and for the reproduction of *Pinus palustris* and *Pinus serotina*. Saturated pine woodlands are susceptible to the effects of fire suppression, over-grazing, hydrologic alteration, or conversion to commercial forest plantations or agriculture. Remaining examples are highly threatened by development, conversion, and alteration of fire regimes. Most of those occurrences which have not been destroyed are severely degraded.

High-ranked species: No information

ELEMENT DISTRIBUTION

Range: This saturated longleaf pine - pond pine woodland association is found only in the Atlantic Coastal Plain from North Carolina to Florida.

Subnations: GA, NC, SC

TNC Ecoregions: 56:C, 57:C

USFS Ecoregions: 232Cb:CCC, 232Ce:CCC

Federal Lands: USFS (Croatan, Francis Marion)

ELEMENT SOURCES

References: Allard 1990, Schafale 1994, Schafale 2000, Schafale and Weakley 1990, Southeastern Ecology Working Group n.d., Taggart 1990

LONGLEAF PINE / COASTAL SWEET-PEPPERBUSH - DANGLEBERRY - RUNNING OAK / LITTLE BLUESTEM WOODLAND

ELEMENT IDENTIFIERS

NVC association: *Pinus palustris* / *Clethra alnifolia* - *Gaylussacia frondosa* - *Quercus pumila* / *Schizachyrium scoparium* Woodland

Database Code: CEGLO04496

Formation: Saturated temperate or subpolar needle-leaved evergreen woodland (II.A.4.N.f)

Alliance: *Pinus palustris* - *Pinus (elliottii, serotina)* Saturated Woodland Alliance (A.578)

ELEMENT CONCEPT

Summary: The open canopy of this association is dominated by *Pinus palustris*. The woody understory may contain *Clethra alnifolia*, *Gaylussacia frondosa* (= var. *frondosa*), and *Quercus pumila*. The perennial grass *Schizachyrium scoparium* is a typically dominant herb. More information to be added from North Carolina Vegetation Survey data.

Environment: No information

Vegetation: The open canopy of this association is dominated by *Pinus palustris*. The woody understory may contain *Clethra alnifolia*, *Gaylussacia frondosa* (= var. *frondosa*), and *Quercus pumila*. The perennial grass *Schizachyrium scoparium* is a typically dominant herb.

Dynamics: No information

Similar Associations:

- *Pinus palustris* / *Arundinaria gigantea ssp. tecta* - *Liquidambar styraciflua* / *Andropogon glomeratus* - *Sarracenia minor* Woodland (CEGL004495) -- a "poorly drained silty woodland (savanna)" (in III.Series 7 of Peet 1996).
- *Pinus palustris* / *Quercus pumila* - *Gaylussacia dumosa* / *Schizachyrium scoparium* Woodland (CEGL004084) -- the drier portion of the running oak woodlands of the wiregrass gap.

Related Concepts:

- *Pinus palustris* / *Clethra alnifolia (sic)* - *Gaylussacia frondosa frondosa* - *Quercus pumila* / *Schizachyrium scoparium* Woodland (Peet 1996) ?

Classification Comments: This is the most common moist flatwoods community of the FMNF, recognized first by Henry Ravenel (1850) over 150 years ago (Glitzenstein and Streng 2004).

CONSERVATION RANKING & RARE SPECIES

GRank: G1 (1997-12-31): This saturated longleaf pine woodland association is restricted to South Carolina. A naturally rare and restricted community type, this longleaf pine woodland has been further impacted by the catastrophic decline of the Longleaf Pine Ecosystem, which once dominated the Coastal Plain landscape of the southeastern United States, and depends on frequent, low-intensity, growing-season fires to control understory vegetation and for the reproduction of *Pinus palustris*. *Pinus palustris*-dominated saturated woodlands are susceptible to the effects of fire suppression, over-grazing, hydrologic alteration, or conversion to commercial forest plantations or agriculture. Remaining examples are highly threatened by development, conversion, and alteration of fire regimes. Most of those occurrences which have not been destroyed are severely degraded.

High-ranked species: No information

ELEMENT DISTRIBUTION

Range: This saturated longleaf pine woodland association is restricted to South Carolina.

Subnations: SC

TNC Ecoregions: 56:P, 57:C

USFS Ecoregions: 232Cb:CCC, 232Ce:CCC

Federal Lands: USFS (Francis Marion)

ELEMENT SOURCES

References: Glitzenstein and Streng 2004, Glitzenstein et al. 2003, NC Vegetation Survey - Southeast U.S. unpubl. data unpubl. data, Peet 1996, Peet et al. unpubl. data 2002, Ravenel 1850, Southeastern Ecology Working Group n.d.

LONGLEAF PINE / SWITCH CANE - SWEETGUM / BUSHY BROOMSEDGE - HOODED PITCHERPLANT WOODLAND

ELEMENT IDENTIFIERS

NVC association: *Pinus palustris* / *Arundinaria gigantea* ssp. *tecta* - *Liquidambar styraciflua* / *Andropogon glomeratus* - *Sarracenia minor* Woodland

Database Code: CEGLO04495

Formation: Saturated temperate or subpolar needle-leaved evergreen woodland (II.A.4.N.f)

Alliance: *Pinus palustris* - *Pinus (elliottii, serotina)* Saturated Woodland Alliance (A.578)

ELEMENT CONCEPT

Summary: The open canopy of this association is dominated by *Pinus palustris*. The woody understory may contain *Arundinaria gigantea* ssp. *tecta* and *Liquidambar styraciflua*. Some characteristic herbs include *Andropogon glomeratus* and *Sarracenia minor*. More detailed information to be added from North Carolina Vegetation Survey plot data.

Environment: No information

Vegetation: The open canopy of this association is dominated by *Pinus palustris*. The woody understory may contain *Arundinaria gigantea* ssp. *tecta* and *Liquidambar styraciflua*. Some characteristic herbs include *Andropogon glomeratus* and *Sarracenia minor*. The following species have higher cover and/or constancy (100% of three plots) in this association than in the related CEGLO04496: *Arundinaria gigantea* ssp. *tecta* (with high cover), *Ctenium aromaticum*, *Panicum virgatum* var. *virgatum*, *Coreopsis linifolia* (= *Coreopsis oniscicarpa*), *Panicum anceps*, *Paspalum setaceum*, *Acer rubrum*, *Osmunda regalis* var. *spectabilis*, *Saccharum giganteum* (= *Erianthus giganteus*), *Triantha racemosa* (= *Tofieldia racemosa*), *Rhynchospora chapmanii*, *Eupatorium leucolepis* var. *leucolepis*, *Hypoxis wrightii* (= *Hypoxis micrantha*), *Agalinis purpurea*, *Panicum verrucosum*, and *Prenanthes autumnalis* (NC Vegetation Survey - Southeast U.S. unpubl. data).

Dynamics: No information

Similar Associations:

- *Pinus palustris* / *Clethra alnifolia* - *Gaylussacia frondosa* - *Quercus pumila* / *Schizachyrium scoparium* Woodland (CEGLO04496)
-- a "moderately drained silty woodland" (in III.Series 8 of Peet 1996).

Related Concepts:

- *Pinus palustris* / *Arundinaria gigantea tecta* / *Liquidambar styraciflua* / *Andropogon glomeratus* Woodland (Peet 1996) ?

Classification Comments:

CONSERVATION RANKING & RARE SPECIES

GRank: G1 (1997-10-16): This saturated longleaf pine woodland association is restricted to South Carolina. It is naturally rare and limited to small occurrences. It is part of the endangered Longleaf Pine Ecosystem, which once dominated the Coastal Plain landscape of the southeastern United States, and depends on frequent, low-intensity, growing-season fires to control understory vegetation and for the reproduction of *Pinus palustris*. *Pinus palustris*-dominated saturated woodlands are susceptible to the effects of fire suppression, over-grazing, hydrologic alteration, or conversion to commercial forest plantations or agriculture. Remaining examples are highly threatened by development, conversion, and alteration of fire regimes. Most of those occurrences which have not been destroyed are severely degraded.

High-ranked species: No information

ELEMENT DISTRIBUTION

Range: This saturated longleaf pine woodland association is restricted to South Carolina.

Subnations: SC

TNC Ecoregions: 56:P, 57:C

USFS Ecoregions: 232Cb:CCC, 232Ce:CCC

Federal Lands: USFS (Francis Marion)

ELEMENT SOURCES

References: Glitzenstein and Streng 2004, NC Vegetation Survey - Southeast U.S. unpubl. data unpubl. data, Peet 1996, Peet et al. unpubl. data 2002, Southeastern Ecology Working Group n.d.

ATLANTIC COASTAL PLAIN PEATLAND POCOSIN

LITTLE GALLBERRY - SHINING FETTERBUSH - HONEYCUPS SHRUBLAND

ELEMENT IDENTIFIERS

NVC association: *Ilex glabra* - *Lyonia lucida* - *Zenobia pulverulenta* Shrubland

Database Code: CEGLO03944

Formation: Saturated mixed evergreen - cold-deciduous shrubland (III.C.2.N.e)

Alliance: *Zenobia pulverulenta* - *Lyonia lucida* - *Ilex (coriacea, glabra)* Saturated Shrubland Alliance (A.1054)

ELEMENT CONCEPT

Summary: Mixed evergreen-deciduous and deciduous low pocosins of peat domes (ombrotrophic blanket bogs) of the Outer and Middle Coastal Plain of North Carolina and possibly South Carolina, with shrub height (0.5-2 m) maintained by extremely poor nutrient status and (secondarily) by occasional fire. Stands are dominated by *Ilex glabra*, *Lyonia lucida*, and *Zenobia pulverulenta*. Very scattered *Pinus serotina* are present (less than 10%), these sometimes of medium stature. This association includes low pocosins of the Dare County peninsula and large peat-filled Carolina bays of the Bladen and Cumberland counties area. Other characteristic species can include *Kalmia cuneata*, *Kalmia carolina*, *Photinia pyrifolia* (= *Aronia arbutifolia*), *Sarracenia flava*, *Woodwardia virginica*, *Carex striata* var. *striata*, *Rhynchospora fascicularis*, and *Lysimachia asperulifolia*.

Environment: This association includes low pocosins of the Dare County peninsula and large peat-filled Carolina bays of the Bladen and Cumberland counties area of North Carolina. Stands are also found in depressions (bays) in the Francis Marion National Forest (South Carolina).

Vegetation: Stands are dominated by *Ilex glabra*, *Lyonia lucida*, and *Zenobia pulverulenta*. Very scattered *Pinus serotina* are present (less than 10%), these sometimes of medium stature. Other characteristic species can include *Kalmia cuneata*, *Kalmia carolina*, *Photinia pyrifolia* (= *Aronia arbutifolia*), *Sarracenia flava*, *Woodwardia virginica*, *Carex striata* var. *striata*, *Rhynchospora fascicularis*, and *Lysimachia asperulifolia*.

Dynamics: The shrub height (0.5-2 m) is maintained by extremely poor nutrient status and (secondarily) by occasional fire.

Similar Associations:

Related Concepts:

- IIC1a. Low Pocosin (Allard 1990) B
- Low Pocosin (Gallberry-Fetterbush Subtype) (Schafale 2000) ?

Classification Comments:

CONSERVATION RANKING & RARE SPECIES

GRank: G2 (2002-10-22): This association is restricted to a narrow range in the Outer Coastal Plain of North Carolina; occurrences can be large. Occurrences suffer from fire exclusion and alteration of natural fire regimes. Stands are also threatened by alteration of the hydrology through drainage, and by conversion of large areas to plantings of *Pinus elliottii* and/or *Pinus taeda*.

High-ranked species: *Kalmia cuneata* (G3), *Lysimachia asperulifolia* (G3)

ELEMENT DISTRIBUTION

Range: This mixed evergreen-deciduous low pocosin type is restricted to peat domes (ombrotrophic blanket bogs) of the Outer and Middle Coastal Plain of North Carolina and possibly South Carolina.

Subnations: NC, SC

TNC Ecoregions: 57:C

USFS Ecoregions: 232Cb:CCC, 232Ce:CCC, 232Ch:CCC

Federal Lands: USFS (Croatan, Francis Marion)

ELEMENT SOURCES

References: Allard 1990, Glitzenstein and Streng 2004, NatureServe Ecology - Southeastern U.S. unpubl. data, Schafale 2000, Schafale and Weakley 1990, Southeastern Ecology Working Group n.d.

POND PINE - LOBLOLLY-BAY / SHINING FETTERBUSH WOODLAND

ELEMENT IDENTIFIERS

NVC association: *Pinus serotina* - *Gordonia lasianthus* / *Lyonia lucida* Woodland

Database Code: CEGLO03671

Formation: Saturated temperate or subpolar needle-leaved evergreen woodland (II.A.4.N.f)

Alliance: *Pinus serotina* Saturated Woodland Alliance (A.581)

ELEMENT CONCEPT

Summary: This community occurs in Outer Coastal Plain peat domes and large peat-filled Carolina bays of eastern North Carolina and northern South Carolina. The open canopy consists of mixtures of *Pinus serotina* and *Gordonia lasianthus*, generally codominant. Various pocosin shrubs form a dense shrub stratum; typical species include *Lyonia lucida*, *Ilex glabra*, *Ilex coriacea*, *Smilax laurifolia*, *Persea palustris*, and others. The herb stratum is typically very sparse. In some areas, as in the Green Swamp, Brunswick County, North Carolina, this community occurs as islands in *Pinus serotina* / *Cyrilla racemiflora* - *Lyonia lucida* Woodland (Kologiski 1977). In other areas, it forms the landscape matrix in unbroken blocks of up to 100 square kilometers.

Environment: This community occurs in large peatlands of the outer and middle Coastal Plain of North Carolina and northern South Carolina. It is attributed to the Francis Marion National Forest of South Carolina.

Vegetation: No information

Dynamics: This community is maintained and altered by periodic fires.

Similar Associations:

- *Pinus serotina* / *Cyrilla racemiflora* - *Lyonia lucida* - *Ilex glabra* Woodland (CEGL003670)

Related Concepts:

- IIC1b. High Pocosin (Allard 1990) B
- Pond Pine Woodland (Loblolly Subtype) (Schafale 2000) ?

Classification Comments:

CONSERVATION RANKING & RARE SPECIES

GRank: G3 (2001-1-30): This community still has extensive occurrences (several exceeding 10,000 acres in size) in the Outer Coastal Plain of North Carolina and South Carolina. Its extent is probably about 50% of the historical extent, because of ditching, draining, and farming of wetlands. This community had a natural fire regime involving periodic fires; this fire regime is now altered by fire suppression, though wildfires in these systems are often uncontrollable and burn extensive areas. Several examples are on protected areas (though fire regime alteration is still the case, since these extensive blocks of high-fuel communities cannot be control-burned legally).

High-ranked species: *Kalmia cuneata* (G3)

ELEMENT DISTRIBUTION

Range: This community is restricted to the Coastal Plain of North and South Carolina, where it occurs in association with large peatlands.

Subnations: NC, SC

TNC Ecoregions: 57:C

USFS Ecoregions: 232Br:CP?, 232Bv:CPP, 232Cb:CCC, 232Ce:CCC, 232Ch:CCC

Federal Lands: DOD (Dare County Bombing Range); USFS (Croatan, Francis Marion); USFWS (Alligator River, Pocosin Lakes?)

ELEMENT SOURCES

References: Allard 1990, Kologiski 1977, Schafale 2000, Schafale and Weakley 1990, Southeastern Ecology Working Group n.d.

POND PINE / SHINING FETTERBUSH - LITTLE GALLBERRY - (TITI) SHRUBLAND

ELEMENT IDENTIFIERS

NVC association: *Pinus serotina* / *Lyonia lucida* - *Ilex glabra* - (*Cyrilla racemiflora*) Shrubland

Database Code: CEGL003846

Formation: Saturated temperate broad-leaved evergreen shrubland with a sparse needle-leaved or mixed evergreen tree layer (III.A.2.N.j)

Alliance: *Lyonia lucida* - *Ilex glabra* Saturated Wooded Shrubland Alliance (A.805)

ELEMENT CONCEPT

Summary: This is the typical high pocosin or tall pocosin of peatlands and wet mineral soils of the southeastern Coastal Plain, ranging from southeastern Virginia south to Georgia and apparently to Florida. *Pinus serotina* individuals are scattered and more-or-less stunted. Typical shrubs, forming a dense tangle with abundant *Smilax laurifolia*, are *Cyrilla racemiflora* (absent in occurrences at the northern limit of the range in southeastern Virginia), *Lyonia lucida*, *Ilex glabra*, *Ilex coriacea*, *Persea palustris*, and sometimes *Kalmia carolina*. Other component shrubs can include *Clethra alnifolia*, *Vaccinium formosum*, *Gaylussacia frondosa* (= var. *frondosa*), *Kalmia cuneata*, *Photinia pyrifolia* (= *Aronia arbutifolia*), *Chamaecyparis thyoides*, *Acer rubrum* var. *trilobum*, *Morella cerifera* (= *Myrica cerifera* var. *cerifera*), *Lyonia ligustrina* var. *foliosiflora*, *Magnolia virginiana*, *Rhododendron viscosum*, and *Toxicodendron radicans*. Compare III.C.2.N.f.

Environment: Stands of this association are found in peatlands and wet mineral soils of the Coastal Plain, from southeastern Virginia and North Carolina south to Georgia and northern Florida. In Florida this association occurs in large poorly drained sandy peat areas. At Fort Benning, Georgia, the soils of this shrubland (CEGL003846) or *Ilex coriacea* - *Lyonia lucida* - *Smilax laurifolia*

Shrubland (CEGL004666) seem wetter than those of *Pinus palustris* - *Pinus serotina* / *Ilex glabra* - *Lyonia lucida* / *Ctenium aromaticum* Woodland (CEGL003860). In dry years, this difference in soil moisture is even more pronounced and evident. CEGL004666 is most often found along drains of narrow streams in highly dissected topographic situations and is therefore in wetter situations than either CEGL003846 or CEGL003860. CEGL004666 would have a less frequent fire-return interval due to higher levels of soil moisture than either CEGL003846 or CEGL003860. Burns in CEGL004666 would require a very dry year to allow fire to burn more than just the edges of this habitat type. CEGL003846 is in open, flat situations with saturated soils, but does not have the diverse herbaceous component seen in CEGL003860 due to a dense broad-leaved evergreen shrub component which would indicate a less frequent fire-return interval than CEGL003860. Furthermore, CEGL003846 does not have an open, continuous tree canopy; rather, canopy trees are sparse, scattered and often appear to have a stunted growth form (M. Mulligan pers. comm.).

Vegetation: In this essentially shrub-dominated association, *Pinus serotina* individuals are scattered and more-or-less stunted. Typical shrubs, forming a dense tangle with abundant *Smilax laurifolia*, are *Cyrilla racemiflora* (absent in occurrences at the northern limit of the range in southeastern Virginia), *Lyonia lucida*, *Ilex glabra*, *Ilex coriacea*, *Persea palustris*, and sometimes *Kalmia carolina*. Other component shrubs can include *Clethra alnifolia*, *Vaccinium formosum*, *Gaylussacia frondosa* (= var. *frondosa*), *Kalmia cuneata*, *Photinia pyrifolia* (= *Aronia arbutifolia*), *Chamaecyparis thyoides*, *Acer rubrum* var. *trilobum*, *Morella cerifera* (= *Myrica cerifera* var. *cerifera*), *Lyonia ligustrina* var. *foliosiflora*, *Magnolia virginiana*, *Rhododendron viscosum*, and *Toxicodendron radicans*. Florida plots additionally included *Lyonia ferruginea*, *Serenoa repens*, *Vaccinium myrsinites*, *Gordonia lasianthus*, *Taxodium ascendens*, *Pinus elliotii*, *Leucothoe racemosa*, and *Sarracenia minor*. Certain species known from this association in the Carolinas do not occur in the association in Florida. These include *Kalmia carolina*, *Kalmia cuneata*, and *Chamaecyparis thyoides*.

Dynamics: This association is prone to infrequent high-intensity wildfire.

Similar Associations:

- *Pinus serotina* / *Zenobia pulverulenta* - *Cyrilla racemiflora* - *Lyonia lucida* Wooded Shrubland (CEGL004458) -- is deciduous-dominated High Pocosin with a more restricted distribution.

Related Concepts:

- *Pinus serotina* / *Smilax laurifolia* - *Lyonia lucida* - *Kalmia carolina* Association (Fleming 1998) ?
- High Pocosin (Evergreen Subtype) (Schafale 2000) ?
- IIC1b. High Pocosin (Allard 1990) B
- Shrub Bog (Wharton 1978) B

Classification Comments: Georgia occurrences (in the Outer Coastal Plain) are in different topographic settings; they are found in depressional wetlands (Carolina bays and limesink wetlands) and along stream borders. They may have significantly different floristics as well; they lack *Chamaecyparis thyoides* and may lack *Rhus copallinum* and *Kalmia carolina* among other species. More work is needed to determine whether these should be in a different association. Virginia occurrences lack *Cyrilla racemiflora*; the alliance name has been changed to reflect this, and an additional association may be needed in this case as well. Florida examples of this association are from Pinhook Swamp and Impassable Bay (Osceola NF) and Bradwell Bay (Apalachicola NF). These are very large poorly drained areas. Some stands from the Fall-line Sandhills of Fort Benning, Georgia (East Gulf Coastal Plain), at or near the local northern-most edge of the distribution of *Pinus serotina* are placed here. The polygons that have been referred here (A.805) have dense evergreen shrubs (mostly *Ilex glabra* and *Ilex coriacea*) with some *Arundinaria gigantea*. They also have dense *Smilax* spp. (M. Mulligan pers. comm. 2001). See Element Occurrence CEGL003846*002*FB for more information. All three of these alliances and associations (CEGL003860, CEGL004666 and CEGL003846) are found at Fort Benning. This is primarily due to the dynamic nature of the vegetation types that are found in upland saturated soil conditions in a longleaf pine matrix. These vary among woodlands, shrublands, wooded shrublands and forests. Differences in fire intensity and fire frequency are common in these systems and often depend on season of burn, soil moisture levels, and burn return intervals. Divergence in these variables can play a significant role in the resulting vegetation structure and composition of the saturated woodlands, shrublands and wooded shrublands.

CONSERVATION RANKING & RARE SPECIES

GRank: G3 (2001-1-30): This high pocosin or tall pocosin vegetation is restricted to peatlands and wet mineral soils of the southeastern Coastal Plain, ranging from southeastern Virginia south to Georgia and northern Florida. Although formerly extensive, these communities are threatened by wetland alternation (ditching and draining). Additionally, the structure and composition of this community type are maintained by periodic catastrophic fires, which are now suppressed as wildfires, and are not allowable as controlled burns. For this reason, even 'protected' occurrences are not readily manageable to approximate natural fire return intervals and intensities.

High-ranked species: *Kalmia cuneata* (G3), *Peltandra sagittifolia* (G3G4)

ELEMENT DISTRIBUTION

Range: This high pocosin or tall pocosin vegetation is found in the southeastern Coastal Plain from southeastern Virginia south to Georgia and northern Florida.

Subnations: FL, GA, NC, SC, VA

TNC Ecoregions: 53:C, 56:C, 57:C

USFS Ecoregions: 232Br:CPP, 232Ca:CCC, 232Cb:CCC, 232Cc:CCP, 232Cd:CCC, 232Cf:CCP, 232Ch:CCC, 232Dc:CCC

Federal Lands: DOD (Camp Lejeune, Dare County Bombing Range, Fort Benning?); USFS (Apalachicola, Croatan, Francis Marion, Osceola); USFWS (Alligator River, Great Dismal Swamp, Okefenokee, Pocosin Lakes)

ELEMENT SOURCES

References: Allard 1990, Christensen 1979, Fleming 1998, Fleming et al. 2001, Glitzenstein and Streng 2004, Kologiski 1977, Mulligan pers. comm., NatureServe Ecology - Southeastern U.S. unpubl. data, Schafale 2000, Schafale and Weakley 1990, Sharitz and Gibbons 1982, Southeastern Ecology Working Group n.d., Wharton 1978

POND PINE / SWITCH CANE WOODED SHRUBLAND

ELEMENT IDENTIFIERS

NVC association: *Pinus serotina* / *Arundinaria gigantea* ssp. *tecta* Wooded Shrubland

Database Code: CEGLO03851

Formation: Saturated temperate broad-leaved evergreen shrubland with a sparse needle-leaved or mixed evergreen tree layer (III.A.2.N.j)

Alliance: *Arundinaria gigantea* Saturated Wooded Shrubland Alliance (A.804)

ELEMENT CONCEPT

Summary: This community is characterized by dense stands of *Arundinaria gigantea* ssp. *tecta* occasionally reaching 5 m in height, with scattered to fairly dense *Pinus serotina* (sometimes with some *Nyssa biflora* or *Liriodendron tulipifera*). Physiognomy and structure vary with fire-return interval. In areas that burn every 3-5 years, the appearance of the community will be that of nearly pure *Arundinaria gigantea* ssp. *tecta*, perhaps with scattered *Pinus serotina*. Cover of pocosin shrubs (e.g., *Ilex glabra*, *Ilex coriacea*, *Lyonia lucida*, *Lyonia ligustrina* var. *foliosiflora*, *Cyrilla racemiflora*, *Zenobia pulverulenta*, *Magnolia virginiana*, *Photinia pyrifolia* (= *Aronia arbutifolia*)) and *Acer rubrum* var. *trilobum* increases with lack of fire, and with fire suppression greater than 15 years, these species will overtake the cane. This community occurs on shallow organic soils (10-100 cm deep), in areas which burn every 3-12 years. Typically it is found around the periphery of deep peat deposits where peat feathers out onto mineral soil, in peat-filled depressions and sloughs in pine barrens, or on upland flats where drainage is poor enough to permit accumulation of an organic layer deep enough to support the cane rhizome mat. It is likely that the soil is saturated throughout most of the winter and spring, and probably dries out in the summer and fall. Organic matter depth, fire frequency, and nutrient availability are the primary factors controlling vegetation structure and composition in this community. Occurrences are known from the Mid-Atlantic Coastal Plain of South Carolina, North Carolina and Virginia.

Environment: This community occurs on shallow organic soils (10-100 cm deep), in areas which burn every 3-12 years. Typically it is found around the periphery of deep peat deposits where peat feathers out onto mineral soil, in peat-filled depressions and sloughs in pine barrens, or on upland flats where drainage is poor enough to permit accumulation of an organic layer deep enough to support the cane rhizome mat. It is likely that the soil is saturated throughout most of the winter and spring, and probably dries out in the summer and fall.

Vegetation: This community is characterized by dense stands of *Arundinaria gigantea* ssp. *tecta* occasionally reaching 5 m in height, with scattered to fairly dense *Pinus serotina* (sometimes with some *Nyssa biflora* or *Liriodendron tulipifera*). Physiognomy and structure vary with fire-return interval. In areas that burn every 3-5 years, the appearance of the community will be that of nearly pure *Arundinaria gigantea* ssp. *tecta*, perhaps with scattered *Pinus serotina*. Cover of pocosin shrubs (e.g., *Ilex glabra*, *Ilex coriacea*, *Lyonia lucida*, *Lyonia ligustrina* var. *foliosiflora*, *Cyrilla racemiflora*, *Zenobia pulverulenta*, *Magnolia virginiana*, *Photinia pyrifolia* (= *Aronia arbutifolia*)) and *Acer rubrum* var. *trilobum* increases with lack of fire, and with fire suppression greater than 15 years, these species will overtake the cane.

Dynamics: Organic matter depth, fire frequency, and nutrient availability are the primary factors controlling vegetation structure and composition in this community. Cover of pocosin shrubs (e.g., *Ilex glabra*, *Ilex coriacea*, *Lyonia lucida*, *Lyonia ligustrina* var. *foliosiflora*, *Cyrilla racemiflora*, *Zenobia pulverulenta*, *Magnolia virginiana*, *Photinia pyrifolia*), and *Acer rubrum* var. *trilobum* increases with lack of fire, and with fire suppression greater than 15 years, these species will overtake the cane. It is likely that the soil where this community occurs is saturated throughout most of the winter and spring, and probably dries out in the summer and fall.

Similar Associations:

- *Pinus serotina* / *Arundinaria gigantea* ssp. *tecta* Woodland (CEGL004433)

Related Concepts:

- IIB2c. Peatland Canebrake (Allard 1990) B

Classification Comments: This community is thought to have been common in presettlement times, existing as large, open tracts. Most of the presettlement acreage has succeeded to pocosin vegetation because of fire exclusion or has been drained and cleared for agriculture. This community, or one similar to it, may be present in southern Georgia and in Florida (S. Orzell pers. comm.). See the II.A.4.N.f *Pinus serotina* Saturated Woodland Alliance (A.581), *Pinus serotina* / *Arundinaria gigantea* ssp. *tecta* Woodland (CEGL004433) for modern variant.

CONSERVATION RANKING & RARE SPECIES

GRank: G1 (2004-4-14): This wooded shrubland is restricted in range and highly specific in habitat preference. This community is restricted to shallow organic soils (10-100 cm deep), in areas which burn every three to twelve years, around the periphery of deep peat deposits where peat feathers out onto mineral soil, and in similar areas. Its physiognomy and structure vary with fire-return interval. With frequent fire (every three to five years), the vegetation is nearly pure dense stands of switch cane, perhaps with

scattered *Pinus serotina*. Cover of pocosin shrubs increases with lack of fire, and with fire suppression greater than 15 years, these species will overtake the cane. Occurrences are known from the Mid-Atlantic Coastal Plain of South Carolina, North Carolina and Virginia. This community is thought to have been common in presettlement times, existing as large, open tracts. Most of the presettlement acreage has succeeded to pocosin vegetation because of fire exclusion or has been drained and cleared for agriculture. Remaining examples are highly threatened by development, conversion, and alteration of fire regimes. Most of those occurrences which have not been destroyed are severely degraded.

High-ranked species: No information

ELEMENT DISTRIBUTION

Range: Occurrences of this community are known from the Mid-Atlantic Coastal Plain of South Carolina, North Carolina and Virginia.

Subnations: NC, SC, VA

TNC Ecoregions: 56:?, 57:C

USFS Ecoregions: 232:C

Federal Lands: DOD (Fort Bragg); USFS (Croatan?, Francis Marion)

ELEMENT SOURCES

References: Allard 1990, Fleming et al. 2001, Frost 1989, Frost n.d., Glitzenstein and Streng 2004, Heineke 1987, Hughes 1966, Meanley 1972, Orzell pers. comm., Platt and Brantley 1997, Schafale and Weakley 1990, Southeastern Ecology Working Group n.d.

POND PINE / TITI - SHINING FETTERBUSH - LITTLE GALLBERRY WOODLAND

ELEMENT IDENTIFIERS

NVC association: *Pinus serotina* / *Cyrilla racemiflora* - *Lyonia lucida* - *Ilex glabra* Woodland

Database Code: C EGL003670

Formation: Saturated temperate or subpolar needle-leaved evergreen woodland (II.A.4.N.f)

Alliance: *Pinus serotina* Saturated Woodland Alliance (A.581)

ELEMENT CONCEPT

Summary: This woodland, with a canopy dominated by *Pinus serotina* (cover greater than 50%) over a dense shrub layer, occurs within a mosaic of other peatland communities on poorly drained interstream flats of outer coastal terraces. The canopy is variable in closure, from closed to fairly sparse; larger shrubs range from 2-4 m in height. The community also occurs in isolated wetlands such as Carolina bays. Other canopy species in this community can include *Gordonia lasianthus*, *Magnolia virginiana*, *Persea palustris*, *Acer rubrum* var. *trilobum* (in fire-suppressed examples), *Pinus taeda* (in disturbed examples), and less commonly, *Chamaecyparis thyoides*. The bay species, *Gordonia lasianthus*, *Persea palustris*, and *Magnolia virginiana*, are present also in the shrub layer. Other shrubs present include *Ilex myrtifolia*, *Clethra alnifolia*, *Morella caroliniensis* (= *Myrica heterophylla*), *Photinia pyrifolia* (= *Aronia arbutifolia*), and *Viburnum nudum* var. *nudum*. Herbs generally are not common. This community is present on the Coastal Plain from northern North Carolina to South Carolina, but probably absent from Georgia and northern Florida.

Environment: Fire regime is the important determinant of the development of this community. Fire-return time of greater than approximately 15 years favors development of this community over other pocosin types. Soils have intermediate to deep peat layers and intermediate to long hydroperiods. They are moist and nutrient-poor although some may receive nutrients from water flowing into the community; series in North Carolina include Croatan (Typic Medisaprist), Murville (Typic Haplaquod), Lynn Haven (Typic Haplaquod), Torhunta (Typic Humaquept), Ponzer (Terric Medisaprist), Roper (Histic Humaquept) and Pungo (Typic Medisaprist). The community is most common within a mosaic of other peatland communities on poorly drained interstream flats of outer coastal terraces, but also occurs in isolated wetlands such as Carolina bays.

Vegetation: Other canopy species in this community are *Gordonia lasianthus*, *Magnolia virginiana*, *Persea palustris*, *Acer rubrum*, *Pinus taeda*, and less commonly *Chamaecyparis thyoides*. The bay species, *Gordonia*, *Persea* and *Magnolia*, are present also in the shrub layer. Other shrubs present include *Ilex myrtifolia*, *Clethra alnifolia*, *Morella caroliniensis* (= *Myrica heterophylla*), *Photinia pyrifolia* (= *Aronia arbutifolia*), and *Viburnum nudum*. Herbs generally are not common.

Dynamics: No information

Similar Associations:

- *Pinus serotina* - *Gordonia lasianthus* / *Lyonia lucida* Woodland (CEGL003671) -- differing mainly in the prevalence of *Gordonia* as a community codominant.
- *Pinus serotina* / *Cyrilla racemiflora* - *Lyonia lucida* - *Vaccinium fuscatum* Woodland (CEGL004434) -- similarly named but different, occurring in isolated depressional wetlands in pinelands.
- *Pinus serotina* / *Ilex glabra* / *Woodwardia virginica* Woodland (CEGL004652)

Related Concepts:

- IIB2b. Pond Pine Woodland (Allard 1990) B
- Pond Pine (36) (USFS 1988) ?
- Pond Pine Woodland (Shrub Subtype) (Schafale 2000) ?

- Pond Pine: 98 (Eyre 1980) B

Classification Comments: Virginia high pocosins are *Pinus serotina* over *Lyonia lucida*, *Ilex coriacea*, and *Kalmia carolina*; they lack *Cyrilla racemiflora* and are probably not appropriately placed here [see *Pinus serotina* / *Ilex glabra* / *Woodwardia virginica* Woodland (CEGL004652)]. Note the existence of the similarly named but different *Pinus serotina* / *Cyrilla racemiflora* - *Lyonia lucida* - *Vaccinium fuscatum* Woodland (CEGL004434), which occurs in small depression wetlands and has very different landscape processes.

CONSERVATION RANKING & RARE SPECIES

GRank: G3 (2001-1-30): This community still has extensive occurrences (several exceeding 20,000 acres in size) in the Outer Coastal Plain of North Carolina. Its extent is probably about 60% of the historical extent, because of ditching, draining, and farming of wetlands. This community had a natural fire regime involving periodic fires; this fire regime is now altered by fire suppression, though wildfires in these systems are often uncontrollable and burn extensive areas. Several examples are on protected areas (though fire regime alteration is still the case, since these extensive blocks of high-fuel communities cannot be control-burned legally).

High-ranked species: *Kalmia cuneata* (G3)

ELEMENT DISTRIBUTION

Range: This community occurs in large peatlands in the outer and middle Coastal Plain of North Carolina and northern South Carolina.

Subnations: NC, SC

TNC Ecoregions: 57:C

USFS Ecoregions: 232Ch:CCC

Federal Lands: DOD (Dare County Bombing Range); USFS (Croatan, Francis Marion); USFWS (Alligator River, Cedar Island, Great Dismal Swamp, Pocosin Lakes)

ELEMENT SOURCES

References: Allard 1990, Doyle and Allard 1990, Eyre 1980, Kologiski 1977, Schafale 2000, Schafale and Weakley 1990, Southeastern Ecology Working Group n.d., USFS 1988

ATLANTIC COASTAL PLAIN SMALL BLACKWATER RIVER FLOODPLAIN FOREST

BALD-CYPRESS - SWAMP BLACKGUM / WATER ASH / SHINING FETTERBUSH FOREST

ELEMENT IDENTIFIERS

NVC association: *Taxodium distichum* - *Nyssa biflora* / *Fraxinus caroliniana* / *Lyonia lucida* Forest

Database Code: CEGL004733

Formation: Seasonally flooded cold-deciduous forest (I.B.2.N.e)

Alliance: *Taxodium distichum* - *Nyssa (aquatica, biflora, ogeche)* Seasonally Flooded Forest Alliance (A.337)

ELEMENT CONCEPT

Summary: This forest type includes very wet forests of the southeastern Coastal Plain in North Carolina and South Carolina that are flooded by river overbank flow for long periods, and are dominated by combinations of *Nyssa biflora*, *Taxodium distichum*, and *Taxodium ascendens*. This community occurs along Coastal Plain streams which lack clay sediment, where *Nyssa aquatica* is not a significant component of the canopy. This community occurs in the most acidic and clay-free streams and consequently is found within coarse-sandy landscapes.

Environment: This community occurs along Coastal Plain streams which lack clay sediment, where *Nyssa aquatica* is not a significant component of the canopy. This community occurs in the most acidic and clay-free streams and consequently is found within coarse-sandy landscapes.

Vegetation: Stands are dominated by combinations of *Nyssa biflora*, *Taxodium distichum*, and *Taxodium ascendens*. *Nyssa aquatica* is not a significant component of the canopy.

Dynamics: No information

Similar Associations:

Related Concepts:

- Cypress--Gum Swamp (Acid Blackwater Subtype) (Schafale 2000) ?

Classification Comments:

CONSERVATION RANKING & RARE SPECIES

GRank: G3G4 (2001-1-31): This cypress-gum swamp occurs in the most acid landscapes of the southeastern Coastal Plain in North Carolina and South Carolina. There are over 20 occurrences recorded in North Carolina, totaling less than 10,000 acres, though additional occurrences exist. Nearly all examples have been altered by timber harvest, and many have also been altered by sedimentation and hydrologic changes to upstream areas in the watershed.

High-ranked species: No information

ELEMENT DISTRIBUTION

Range: This cypress-gum swamp occurs in the most acid landscapes of the southeastern Coastal Plain in North Carolina and South Carolina.

Subnations: NC, SC

TNC Ecoregions: 57:C

USFS Ecoregions: 232Bq:CCC, 232Bv:CCP, 232Ca:CCC, 232Cb:CCC, 232Ce:CCC

Federal Lands: DOD (Camp Lejeune, Camp MacKall); USFS (Croatan, Francis Marion)

ELEMENT SOURCES

References: Peet et al. unpubl. data 2002, Schafale 2000, Schafale and Weakley 1990, Schafale pers. comm., Southeastern Ecology Working Group n.d.

BALD-CYPRESS - WATER TUPELO - SWAMP BLACKGUM / WATER ASH / VIRGINIA-WILLOW FOREST

ELEMENT IDENTIFIERS

NVC association: *Taxodium distichum* - *Nyssa aquatica* - *Nyssa biflora* / *Fraxinus caroliniana* / *Itea virginica* Forest

Database Code: CEGLO07432

Formation: Semipermanently flooded cold-deciduous forest (I.B.2.N.f)

Alliance: *Nyssa aquatica* - (*Taxodium distichum*) Semipermanently Flooded Forest Alliance (A.345)

ELEMENT CONCEPT

Summary: One type of small blackwater stream swamp forest of the Atlantic Coastal Plain, characteristically associated with ambiguously blackwater rivers. This type covers very wet forests that are flooded by river overbank flow for long periods and are dominated by combinations of *Nyssa aquatica*, *Nyssa biflora*, *Taxodium distichum*, and *Taxodium ascendens*. This type covers examples along Coastal Plain streams in regions of fine-textured soils and examples in somewhat isolated basins of brownwater floodplains, where *Nyssa aquatica* and *Nyssa biflora* are both important components of the canopy. This forest is common along small rivers that arise in the Atlantic Coastal Plain (blackwater rivers) from Virginia to northern Florida. Dominant species, which account for at least 75% of the canopy cover, are *Taxodium distichum*, *Nyssa aquatica*, and *Nyssa biflora*. Other bottomland species often found in this community include *Acer rubrum*, *Liquidambar styraciflua*, and *Quercus laurifolia*. The shrub layer generally is open, and *Itea virginica* is common. The herbaceous layer is very sparse and limited to higher areas and tree bases. The dominant species in this stratum is *Phanopyrum gymnocarpon*; other typical species include *Boehmeria cylindrica*, *Saururus cernuus*, *Justicia ovata*, *Carex lupulina*, *Hydrocotyle verticillata*, *Mikania scandens*, *Spiranthes cernua*, *Asclepias perennis*, *Commelina virginica*, *Leersia lenticularis*, and others. Some stands may have a distinctive understory of *Arundinaria gigantea*. Soils are semipermanently flooded, and probability of annual flooding is 100%. More work needs to be done to understand the geographic variation in the type.

Environment: This association is one type of small blackwater stream swamp forest of the Atlantic Coastal Plain and is characteristically associated with ambiguously blackwater rivers. This type covers very wet forests that are flooded by river overbank flow for long periods. This type covers examples along Coastal Plain streams in regions of fine-textured soils and examples in somewhat isolated basins of brownwater floodplains. The soils are semipermanently flooded, and the probability of annual flooding is 100%. An occurrence is known from the Pungo soil series. More work needs to be done to understand the geographic variation in the type.

Vegetation: This type is dominated by combinations of *Nyssa aquatica*, *Nyssa biflora*, *Taxodium distichum*, and *Taxodium ascendens*; *Nyssa aquatica* and *Nyssa biflora* are both important components of the canopy. Dominant species, which account for at least 75% of the canopy cover, are *Taxodium distichum*, *Nyssa aquatica*, and *Nyssa biflora*. Other bottomland species often found in this community include *Acer rubrum*, *Liquidambar styraciflua*, and *Quercus laurifolia*. The shrub layer generally is open, and *Itea virginica* is common. The herbaceous layer is very sparse and limited to higher areas and tree bases. The dominant species in this stratum is *Phanopyrum gymnocarpon*; other typical species include *Boehmeria cylindrica*, *Saururus cernuus*, *Justicia ovata*, *Carex lupulina*, *Hydrocotyle verticillata*, *Mikania scandens*, *Spiranthes cernua*, *Asclepias perennis*, *Commelina virginica*, *Leersia lenticularis*, and others. Some stands may have a distinctive understory of *Arundinaria gigantea*.

Dynamics: The community experiences annual flooding. Exact successional dynamics of the community are not known, but with significant sediment deposition, bottomland hardwood communities possibly may develop.

Similar Associations:

- *Taxodium distichum* - (*Nyssa aquatica*) / *Forestiera acuminata* - *Planera aquatica* Forest (CEGL002421) -- is found in the floodplains of larger rivers.
- *Taxodium distichum* - *Nyssa aquatica* / *Fraxinus caroliniana* Forest (CEGL007431) -- is found in the floodplains of larger rivers.

Related Concepts:

- *Nyssa aquatica* - *Taxodium distichum* / *Fraxinus caroliniana* / *Triadenum walteri* Semipermanently Flooded Forest (Fleming 1998) ?
- Baldcypress - Tupelo: 102 (Eyre 1980) B

- Cypress--Gum Swamp (Intermediate Subtype) (Schafale 2000) ?
- IIA4c. Bald Cypress - Swamp Black Gum Swamp (Allard 1990) B
- Mesotrophic Semipermanently Flooded Forest (Rawinski 1992) B

Classification Comments: Although not included in the distribution of this type, vegetation with these nominals as dominants occurs in Arkansas (D. Zollner pers. comm.).

CONSERVATION RANKING & RARE SPECIES

GRank: G3G4 (1998-5-12): This community type is thought to be relatively secure globally, but the global status needs further assessment.

High-ranked species: *Cardamine longii* (G3), *Carex decomposita* (G3), *Lejeunea bermudiana* (G3G4)

ELEMENT DISTRIBUTION

Range: *Taxodium distichum* - *Nyssa aquatica* - *Nyssa biflora* / *Fraxinus caroliniana* / *Itea virginica* Forest is common along small rivers that arise in the Atlantic Coastal Plain (blackwater rivers) from Virginia to northern Florida.

Subnations: FL, GA, NC, SC, VA

TNC Ecoregions: 56:C, 57:C

USFS Ecoregions: 232Cb:CCC, 232Ce:CCC

Federal Lands: DOE (Savannah River Site); NPS (Congaree Swamp); USFS (Croatan, Francis Marion)

ELEMENT SOURCES

References: Allard 1990, Ambrose 1990a, Applequist 1959, Burdant et al. 1977, Burns and Honkala 1990a, Christensen 1988, Demaree 1932, Eyre 1980, FNAI 1992a, Fleming 1998, Fleming et al. 2001, Klawitter 1962, Martin et al. 1993, Mitsch and Gosselink 1986, Nelson 1986, Oberholster 1993, Peet et al. unpubl. data 2002, Penfound and Hall 1939, Radford and Martin 1975, Rawinski 1992, Schafale 2000, Schafale and Weakley 1990, Smith 1996a, Southeastern Ecology Working Group n.d., TNC 1998b, Wharton et al. 1982, Wieland 1994b, Zollner pers. comm.

ATLANTIC COASTAL PLAIN SMALL BROWNWATER RIVER FLOODPLAIN FOREST

BALD-CYPRESS - WATER TUPELO - SWAMP BLACKGUM / WATER ASH / VIRGINIA-WILLOW FOREST

ELEMENT IDENTIFIERS

NVC association: *Taxodium distichum* - *Nyssa aquatica* - *Nyssa biflora* / *Fraxinus caroliniana* / *Itea virginica* Forest

Database Code: CEGLO07432

Formation: Semipermanently flooded cold-deciduous forest (I.B.2.N.f)

Alliance: *Nyssa aquatica* - (*Taxodium distichum*) Semipermanently Flooded Forest Alliance (A.345)

ELEMENT CONCEPT

Summary: One type of small blackwater stream swamp forest of the Atlantic Coastal Plain, characteristically associated with ambiguously blackwater rivers. This type covers very wet forests that are flooded by river overbank flow for long periods and are dominated by combinations of *Nyssa aquatica*, *Nyssa biflora*, *Taxodium distichum*, and *Taxodium ascendens*. This type covers examples along Coastal Plain streams in regions of fine-textured soils and examples in somewhat isolated basins of brownwater floodplains, where *Nyssa aquatica* and *Nyssa biflora* are both important components of the canopy. This forest is common along small rivers that arise in the Atlantic Coastal Plain (blackwater rivers) from Virginia to northern Florida. Dominant species, which account for at least 75% of the canopy cover, are *Taxodium distichum*, *Nyssa aquatica*, and *Nyssa biflora*. Other bottomland species often found in this community include *Acer rubrum*, *Liquidambar styraciflua*, and *Quercus laurifolia*. The shrub layer generally is open, and *Itea virginica* is common. The herbaceous layer is very sparse and limited to higher areas and tree bases. The dominant species in this stratum is *Phanopyrum gymnocarpon*; other typical species include *Boehmeria cylindrica*, *Saururus cernuus*, *Justicia ovata*, *Carex lupulina*, *Hydrocotyle verticillata*, *Mikania scandens*, *Spiranthes cernua*, *Asclepias perennis*, *Commelina virginica*, *Leersia lenticularis*, and others. Some stands may have a distinctive understory of *Arundinaria gigantea*. Soils are semipermanently flooded, and probability of annual flooding is 100%. More work needs to be done to understand the geographic variation in the type.

Environment: This association is one type of small blackwater stream swamp forest of the Atlantic Coastal Plain and is characteristically associated with ambiguously blackwater rivers. This type covers very wet forests that are flooded by river overbank flow for long periods. This type covers examples along Coastal Plain streams in regions of fine-textured soils and examples in somewhat isolated basins of brownwater floodplains. The soils are semipermanently flooded, and the probability of annual flooding is 100%. An occurrence is known from the Pungo soil series. More work needs to be done to understand the geographic variation in the type.

Vegetation: This type is dominated by combinations of *Nyssa aquatica*, *Nyssa biflora*, *Taxodium distichum*, and *Taxodium ascendens*; *Nyssa aquatica* and *Nyssa biflora* are both important components of the canopy. Dominant species, which account for at least 75% of the canopy cover, are *Taxodium distichum*, *Nyssa aquatica*, and *Nyssa biflora*. Other bottomland species often found in this community include *Acer rubrum*, *Liquidambar styraciflua*, and *Quercus laurifolia*. The shrub layer generally is open, and *Itea*

virginica is common. The herbaceous layer is very sparse and limited to higher areas and tree bases. The dominant species in this stratum is *Phanopyrum gymnocarpon*; other typical species include *Boehmeria cylindrica*, *Saururus cernuus*, *Justicia ovata*, *Carex lupulina*, *Hydrocotyle verticillata*, *Mikania scandens*, *Spiranthes cernua*, *Asclepias perennis*, *Commelina virginica*, *Leersia lenticularis*, and others. Some stands may have a distinctive understory of *Arundinaria gigantea*.

Dynamics: The community experiences annual flooding. Exact successional dynamics of the community are not known, but with significant sediment deposition, bottomland hardwood communities possibly may develop.

Similar Associations:

- *Taxodium distichum* - (*Nyssa aquatica*) / *Forestiera acuminata* - *Planera aquatica* Forest (CEGL002421) -- is found in the floodplains of larger rivers.
- *Taxodium distichum* - *Nyssa aquatica* / *Fraxinus caroliniana* Forest (CEGL007431) -- is found in the floodplains of larger rivers.

Related Concepts:

- *Nyssa aquatica* - *Taxodium distichum* / *Fraxinus caroliniana* / *Triadenum walteri* Semipermanently Flooded Forest (Fleming 1998) ?
- Baldcypress - Tupelo: 102 (Eyre 1980) B
- Cypress--Gum Swamp (Intermediate Subtype) (Schafale 2000) ?
- IIA4c. Bald Cypress - Swamp Black Gum Swamp (Allard 1990) B
- Mesotrophic Semipermanently Flooded Forest (Rawinski 1992) B

Classification Comments: Although not included in the distribution of this type, vegetation with these nominals as dominants occurs in Arkansas (D. Zollner pers. comm.).

CONSERVATION RANKING & RARE SPECIES

GRank: G3G4 (1998-5-12): This community type is thought to be relatively secure globally, but the global status needs further assessment.

High-ranked species: *Cardamine longii* (G3), *Carex decomposita* (G3), *Lejeunea bermudiana* (G3G4)

ELEMENT DISTRIBUTION

Range: *Taxodium distichum* - *Nyssa aquatica* - *Nyssa biflora* / *Fraxinus caroliniana* / *Itea virginica* Forest is common along small rivers that arise in the Atlantic Coastal Plain (blackwater rivers) from Virginia to northern Florida.

Subnations: FL, GA, NC, SC, VA

TNC Ecoregions: 56:C, 57:C

USFS Ecoregions: 232Cb:CCC, 232Ce:CCC

Federal Lands: DOE (Savannah River Site); NPS (Congaree Swamp); USFS (Croatan, Francis Marion)

ELEMENT SOURCES

References: Allard 1990, Ambrose 1990a, Applequist 1959, Burdant et al. 1977, Burns and Honkala 1990a, Christensen 1988, Demaree 1932, Eyre 1980, FNAI 1992a, Fleming 1998, Fleming et al. 2001, Klawitter 1962, Martin et al. 1993, Mitsch and Gosselink 1986, Nelson 1986, Oberholster 1993, Peet et al. unpubl. data 2002, Penfound and Hall 1939, Radford and Martin 1975, Rawinski 1992, Schafale 2000, Schafale and Weakley 1990, Smith 1996a, Southeastern Ecology Working Group n.d., TNC 1998b, Wharton et al. 1982, Wieland 1994b, Zollner pers. comm.

BALD-CYPRESS - WATER TUPELO / WATER ASH FOREST

ELEMENT IDENTIFIERS

NVC association: *Taxodium distichum* - *Nyssa aquatica* / *Fraxinus caroliniana* Forest

Database Code: CEGL007431

Formation: Semipermanently flooded cold-deciduous forest (I.B.2.N.f)

Alliance: *Nyssa aquatica* - (*Taxodium distichum*) Semipermanently Flooded Forest Alliance (A.345)

ELEMENT CONCEPT

Summary: This is a semipermanently flooded community of brownwater rivers which occurs primarily in the outer Atlantic Coastal Plain extending through the East Gulf Coastal Plain. Vegetation is characterized by a dense canopy composed almost exclusively of straight, tall individuals of *Taxodium distichum* and *Nyssa aquatica* with a sparse to moderate subcanopy and depauperate shrub and herb layers. Occasional individuals of several species (e.g., *Populus heterophylla*, *Salix nigra*, *Nyssa biflora*, *Planera aquatica*, *Ulmus americana*, *Fraxinus profunda*, *Fraxinus caroliniana*, *Carya aquatica*, *Quercus lyrata*) are possible in the canopy or subcanopy. The herbaceous layer is very sparse, and typical species include *Saururus cernuus*, *Proserpinaca pectinata*, *Proserpinaca palustris*, *Asclepias perennis*, *Commelina virginica*, *Leersia lenticularis*, and *Phanopyrum gymnocarpon* (= *Panicum gymnocarpon*). It is found on the lower Atlantic Coastal Plain from southeastern Virginia to southern Georgia, and possibly on the lower Gulf Coastal Plain west to southeastern Louisiana, excluding the Mississippi River Alluvial Plain. It can be found in oxbow lakes and ponds, along the banks of rivers and lakes, on low wet flats and sloughs, swales and backswamps. It occurs only on saturated or flooded soils. Forests dominated by *Taxodium distichum* and *Nyssa aquatica* are common throughout the southeastern Coastal Plain.

Environment: The community occurs on a variety of inundated topographic habitats, including oxbow ponds and lakes, backwater sloughs, along river edges and in various isolated depressions within the floodplain. It is more commonly associated with brownwater than blackwater rivers. Soil types on which it is found include very poorly drained phases of Entisols, Alfisols, Inceptisols, Ultisols, and Spodosols (Burns and Honkala 1990a). Hydrologic regime is the most important environmental determinant of the distribution of this community. Sites experience frequent flooding to near permanent ponding, with floodwater that may be 3 m deep during rainy seasons and may remain for extended periods (Burns and Honkala 1990a). Probability of annual flooding is 100% with soils nearly permanently saturated (Wharton et al. 1982).

Vegetation: Vegetation is characterized by a dense canopy composed almost exclusively of straight, tall individuals of *Taxodium distichum* and *Nyssa aquatica* (together contributing at least 75% of the canopy cover) with a sparse to moderate subcanopy and depauperate shrub and herb layers. Occasional individuals of several species (e.g., *Populus heterophylla*, *Salix nigra*, *Nyssa biflora*, *Planera aquatica*, *Ulmus americana*, *Fraxinus profunda*, *Fraxinus caroliniana*, *Carya aquatica*, *Quercus lyrata*) are possible in the canopy or subcanopy. The herbaceous layer is very sparse, and typical species include *Saururus cernuus*, *Proserpinaca pectinata*, *Proserpinaca palustris*, *Asclepias perennis*, *Commelina virginica*, *Leersia lenticularis*, and *Phanopyrum gymnocarpon* (= *Panicum gymnocarpon*). *Decumaria barbara*, *Toxicodendron radicans*, and *Bignonia capreolata* are commonly occurring vines but usually have <10% cover.

Dynamics: Flooding frequency is approximately 100% of years, and flooding duration is approximately 100% of the growing season. This is a Zone II community.

The community is potentially very long-lasting; bald-cypress trees have been reported to live longer than 1000 years. In areas where sediment accumulates over time, bottomland hardwood forest types may succeed this community.

Similar Associations:

- *Taxodium distichum* - (*Nyssa aquatica*) / *Forestiera acuminata* - *Planera aquatica* Forest (CEGL002421) -- has a similar overstory but differs in understory (and possibly overstory) species and occurs in the Mississippi River Alluvial Plain.
- *Taxodium distichum* - *Nyssa aquatica* - *Acer rubrum* / *Itea virginica* Forest (CEGL007422)
- *Taxodium distichum* / *Lemna minor* Forest (CEGL002420) -- a semipermanently flooded type of standing stagnant water.

Related Concepts:

- Bald Cypress - Water Tupelo Swamp (Oberholster 1993) B
- Bald cypress-water gum community (Jones et al. 1981b) ?
- Baldcypress - Tupelo: 102 (Eyre 1980) B
- Cypress--Gum Swamp (Brownwater Subtype) (Schafale 2000) ?
- IIA4a. Bald Cypress Swamp (Allard 1990) B
- Mesotrophic Semipermanently Flooded Forest (Rawinski 1992) B

Classification Comments: Conceptually, this type (CEGL004731) represents a type occurring along the outer Atlantic Coastal Plain extending through the eastern Gulf Coastal Plain and does NOT extend west of the Mississippi River. *Taxodium distichum* - (*Nyssa aquatica*) / *Forestiera acuminata* - *Planera aquatica* Forest (CEGL002421) represents the West Gulf and interior expressions of this vegetation. This type needs to be resolved with *Taxodium distichum* - *Nyssa aquatica* - *Acer rubrum* / *Itea virginica* Forest (CEGL007422); apparently the conceptual difference is that CEGL007431 is semipermanently flooded while CEGL007422 is seasonally flooded.

CONSERVATION RANKING & RARE SPECIES

GRank: G5? (1998-6-8): No information

High-ranked species: *Carex decomposita* (G3)

ELEMENT DISTRIBUTION

Range: This association is found on the lower Atlantic Coastal Plain from southeastern Virginia to southern Georgia, and possibly on the lower Gulf Coastal Plain west to southeastern Louisiana, excluding the Mississippi River Alluvial Plain. Forests dominated by *Taxodium distichum* and *Nyssa aquatica* are common throughout the southeastern Coastal Plain.

Subnations: AL, FL, GA, LA, NC, SC, TX, VA

TNC Ecoregions: 53:C, 56:C, 57:C

USFS Ecoregions: 232B:CC, 232Cb:CCC, 232Ce:CCC, 232D:CP

Federal Lands: DOE (Savannah River Site); NPS (Congaree Swamp); USFS (Francis Marion)

ELEMENT SOURCES

References: Allard 1990, Ambrose 1990a, Applequist 1959, Burdant et al. 1977, Burns and Honkala 1990a, Christensen 1988, Demaree 1932, Eyre 1980, FNAI 1992a, Fleming et al. 2001, Jones et al. 1981b, Klawitter 1962, Martin et al. 1993, Mitsch and Gosselink 1986, Nelson 1986, Oberholster 1993, Peet et al. unpubl. data 2002, Penfound and Hall 1939, Radford and Martin 1975, Rawinski 1992, Schafale 2000, Schafale and Weakley 1990, Smith 1996a, Southeastern Ecology Working Group n.d., TNC 1998b, Wharton et al. 1982

BLACK WILLOW / COASTAL SWEET-PEPPERBUSH / WATER TUPELO SUCCESSIONAL FOREST

ELEMENT IDENTIFIERS

NVC association: *Salix nigra* / *Clethra alnifolia* / *Nyssa aquatica* Successional Forest

Database Code: CEGLO07411

Formation: Seasonally flooded cold-deciduous forest (I.B.2.N.e)

Alliance: *Salix nigra* Seasonally Flooded Forest Alliance (A.334)

ELEMENT CONCEPT

Summary: This forest, dominated by *Salix nigra*, occurs as a result of clearcut logging of forests dominated by *Taxodium distichum* and/or *Nyssa aquatica*. It occurs in very low areas of river floodplains throughout the lower Atlantic and Gulf coastal plains and in the Mississippi River Alluvial Plain. Succession may lead to re-establishment of dominance by *Taxodium distichum* and *Nyssa aquatica*. Stump sprouts of *Nyssa* spp. may occur as canopy emergents. Tree seedlings of several species (*Taxodium distichum*, *Nyssa aquatica*, *Nyssa biflora*, *Acer rubrum*, and *Fraxinus caroliniana*) may be found growing beneath the shrub layer. Common shrubs are *Clethra alnifolia*, *Lyonia ligustrina* var. *foliosiflora*, *Itea virginica*, and *Morella cerifera* (= *Myrica cerifera*). Occurrences are most common on alluvial soils, usually Inceptisols with a clay component, and most will experience annual flooding.

Environment: This forest occurs as a result of clearcut logging of forests dominated by *Taxodium distichum* and/or *Nyssa aquatica*. It occurs in very low areas of river floodplains throughout the lower Atlantic and Gulf coastal plains and in the Mississippi River Alluvial Plain. Occurrences are most common on alluvial soils, usually Inceptisols with a clay component, and most will experience annual flooding.

Vegetation: Occurrences generally have dense canopy and shrub layers. Stump sprouts of *Nyssa* spp. may occur as canopy emergents. Tree seedlings of several species (*Taxodium distichum*, *Nyssa aquatica*, *Nyssa biflora*, *Acer rubrum*, and *Fraxinus caroliniana*) may be found growing beneath the shrub layer. *Typha latifolia* may occur in dense patches beneath canopy gaps.

Dynamics: Occurrences experience annual flooding. It is possible that this community eventually may become dominated again by *Taxodium distichum* and *Nyssa aquatica*.

Similar Associations:

Related Concepts:

- Black Willow: 95 (Eyre 1980) ?
- IIF3a. Recently Harvested Forested Wetland (Allard 1990) B
- Willow (74) (USFS 1988)

Classification Comments:

CONSERVATION RANKING & RARE SPECIES

GRank: GNA (modified/managed) (2001-2-14): This is a successional forest, which occurs as a result of clearcut logging of forests dominated by other more valuable timber species. It is not a conservation target.

High-ranked species: No information

ELEMENT DISTRIBUTION

Range: Theoretically this forest is possible in suitable habitat where the ranges of *Salix nigra*, *Taxodium distichum*, and *Nyssa aquatica* overlap, i.e., the Atlantic Coastal Plain from southeast Virginia to south Georgia, the Gulf Coastal Plain from about Tallahassee, Florida, west to southeast Texas, and the Mississippi Alluvial Plain to south Arkansas and west Texas. Exact distribution is not known.

Subnations: AL, AR, FL, GA, LA, MS, NC, SC, TN, VA

TNC Ecoregions: 41:?, 42:C, 43:C, 53:C, 56:C, 57:C

USFS Ecoregions: 231B:CC, 232:C, 234A:CC

Federal Lands: USFS (Apalachicola, De Soto, Delta, Francis Marion, Holly Springs?, Kisatchie, Ocala, St. Francis?, Tombigbee?, Tuskegee)

ELEMENT SOURCES

References: Allard 1990, Allen 1958, Eyre 1980, Southeastern Ecology Working Group n.d., USFS 1988

OVERCUP OAK - WATER HICKORY FOREST

ELEMENT IDENTIFIERS

NVC association: *Quercus lyrata* - *Carya aquatica* Forest

Database Code: CEGLO07397

Formation: Seasonally flooded cold-deciduous forest (I.B.2.N.e)

Alliance: *Quercus lyrata* - (*Carya aquatica*) Seasonally Flooded Forest Alliance (A.328)

ELEMENT CONCEPT

Summary: This bottomland forest ranges from the Mid-Atlantic Coastal Plain west to the Mississippi River Alluvial Plain. The canopy is typically dominated by *Quercus lyrata* and *Carya aquatica*. It is distinguished from other *Quercus lyrata* forests of the Gulf region by the absence of *Quercus texana*. Stands that lack *Quercus texana* and have either significant amounts of *Carya aquatica* are covered here [see Similar Associations). Other canopy associates may include *Gleditsia aquatica*, *Liquidambar styraciflua*, *Acer rubrum* var. *drummondii*, *Taxodium distichum*, *Populus deltoides*, and *Diospyros virginiana*. Shrubs include *Planera aquatica*, *Cornus foemina* (= *Cornus stricta*), and *Cephalanthus occidentalis*. Subcanopy, shrub, herbaceous, and vine density and diversity are directly affected by the timing, duration, and depth of seasonal flooding. Herbaceous growth and diversity will be limited in areas of consistently longer hydroperiod. More detailed information is needed on the floristics and environment of this association.

Environment: Forests dominated by the nominal species may commonly occur in wet flats and on old levee ridge edges (Wharton et al. 1982). This is a community of Zone III (Wharton et al. 1982).

Vegetation: Stands are dominated by *Quercus lyrata* and *Carya aquatica*. Other canopy associates may include *Gleditsia aquatica*, *Liquidambar styraciflua*, *Acer rubrum* var. *drummondii*, *Taxodium distichum*, *Populus deltoides*, and *Diospyros virginiana*. Shrubs include *Planera aquatica*, *Cornus foemina* (= *Cornus stricta*), and *Cephalanthus occidentalis* (Wharton et al. 1982). Herbaceous growth and diversity will be limited in areas of consistently longer hydroperiod (Wharton et al. 1982). A stand assigned here from the Francis Marion National Forest, South Carolina, is dominated by *Liquidambar styraciflua* with *Quercus lyrata*, *Acer rubrum*, *Celtis laevigata*, *Quercus laurifolia*, *Carya cordiformis*, and *Ulmus americana* in the canopy. The subcanopy contains *Ilex decidua* in addition to canopy species. Shrubs include *Cornus foemina*, *Ilex decidua*, *Carpinus caroliniana*, and *Crataegus marshallii*. Prominent herbs include *Leersia lenticularis* and *Phanopyrum gymnocarpon*. Other herbs include *Boehmeria cylindrica*, *Dulichium arundinaceum?*, *Carex grayi*, *Asclepias perennis*, and *Polygonum pensylvanicum*.

Dynamics: Subcanopy, shrub, herbaceous, and vine density and diversity are directly affected by the timing, duration, and depth of seasonal flooding. Herbaceous growth and diversity will be limited in areas of consistently longer hydroperiod (Wharton et al. 1982).

Similar Associations:

- *Nyssa biflora* - *Acer rubrum* var. *rubrum* / *Lyonia lucida* Forest (CEGL007864) -- different canopy (*Nyssa biflora*), similar lower strata.
- *Quercus lyrata* - *Carya aquatica* - (*Quercus texana*) / *Forestiera acuminata* Forest (CEGL002423)
- *Quercus lyrata* - *Liquidambar styraciflua* / *Forestiera acuminata* Forest (CEGL002424)

Related Concepts:

- Brownwater Bottomland Hardwoods (Low Subtype) (Schafale 2000) ?
- Overcup oak-water hickory dominance types (Wharton et al. 1982) ?

Classification Comments: Distribution of this association was reduced because of its originally wide geographic range. The distribution of this type west of the Mississippi River needs to be revisited. The conceptual portion of this association west of the East Gulf Coastal Plain was excised and merged with *Quercus lyrata* - *Carya aquatica* - (*Quercus texana*) / *Forestiera acuminata* Forest (CEGL002423). [See *Quercus lyrata* - *Liquidambar styraciflua* / *Forestiera acuminata* Forest (CEGL002424) and *Quercus lyrata* - *Carya aquatica* - (*Quercus texana*) / *Forestiera acuminata* Forest (CEGL002423)]. At the Francis Marion National Forest, stands of CEGL007864 (*Nyssa biflora*) and CEGL007397 (*Quercus lyrata*) are quite similar in their lower strata (Glitzenstein and Streng 2004).

CONSERVATION RANKING & RARE SPECIES

GRank: G4G5 (2004-2-27): Given this type's large range a rank of G4G5 may be appropriate; more information is needed about the number of occurrences and its western distribution.

High-ranked species: No information

ELEMENT DISTRIBUTION

Range: This bottomland forest ranges from the Mid-Atlantic Coastal Plain of North Carolina, South Carolina, Georgia west to the Mississippi River Alluvial Plain of Louisiana, and Mississippi and possibly Tennessee, Kentucky and Arkansas.

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

TNC Ecoregions: 42:C, 43:P, 53:C, 56:C, 57:C

USFS Ecoregions: 231B:CP, 231E:CP, 232Bj:CCP, 232Br:CCP, 232Bs:CCC, 232Cb:CCC, 232Ce:CCC, 232Cg:CCC, 232Ch:CCP, 232Dc:CCC

Federal Lands: USFS (Apalachicola, Croatan, De Soto, Delta, Francis Marion)

ELEMENT SOURCES

References: Glitzenstein and Streng 2004, Peet et al. unpubl. data 2002, Schafale 2000, Schafale and Weakley 1990, Southeastern Ecology Working Group n.d., Wharton et al. 1982

SPRUCE PINE - (DIAMONDLEAF OAK, SWAMP CHESTNUT OAK, WATER OAK) / IRONWOOD / DWARF PALMETTO FOREST

ELEMENT IDENTIFIERS

NVC association: *Pinus glabra* - *Quercus* (*laurifolia*, *michauxii*, *nigra*) / *Carpinus caroliniana* ssp. *caroliniana* / *Sabal minor* Forest
Database Code: CEGLO07544

Formation: Temporarily flooded mixed needle-leaved evergreen - cold-deciduous forest (I.C.3.N.b)

Alliance: *Pinus glabra* - *Quercus* (*laurifolia*, *michauxii*, *nigra*) Temporarily Flooded Forest Alliance (A.431)

ELEMENT CONCEPT

Summary: The closed canopy of this Coastal Plain stream forest is generally dominated by *Pinus glabra* and *Quercus laurifolia* and/or *Quercus michauxii*. Other floodplain oaks, *Quercus nigra*, *Pinus taeda*, and/or *Liquidambar styraciflua* may occur. *Carpinus caroliniana* ssp. *caroliniana* dominates the well-developed subcanopy stratum. *Sabal minor* may be common in at least some occurrences of this association. Shrubs may include *Hypericum galioides*, *Hypericum hypericoides*, *Sebastiania fruticosa*, *Leucothoe racemosa*, *Cyrilla racemiflora*, *Styrax americanus*, *Crataegus marshallii*, *Vaccinium* spp., and *Rhododendron canescens*. Vines include *Berchemia scandens* and *Vitis rotundifolia*. Herbs may include *Chasmanthium laxum*, *Saccharum baldwinii*, *Carex jooirii*, *Osmunda cinnamomea*, and *Mitchella repens*. The liverwort *Pallavicinia lyellii* may be present. This association occurs on natural levees of Coastal Plain streams, both blackwater and brownwater, in Georgia, Alabama, Mississippi, southern South Carolina, and Florida.

Environment: This association occurs on natural levees of Coastal Plain streams, both blackwater and brownwater, in Mississippi, Alabama, Florida, Georgia, and southern South Carolina.

Vegetation: The closed canopy of this forest is generally dominated by *Pinus glabra* and *Quercus laurifolia* and/or *Quercus michauxii*. Other floodplain oaks, *Quercus nigra*, *Pinus taeda*, and/or *Liquidambar styraciflua* may also occur. *Carpinus caroliniana* ssp. *caroliniana* dominates the well-developed subcanopy stratum. *Sabal minor* and/or *Arundinaria gigantea* may be common in at least some occurrences of this association (FNAI 1992b). Shrubs may include *Hypericum galioides*, *Hypericum hypericoides*, *Sebastiania fruticosa*, *Leucothoe racemosa*, *Cyrilla racemiflora*, *Styrax americanus*, *Crataegus marshallii*, *Vaccinium elliotii*, and *Rhododendron canescens*. Vines include *Berchemia scandens* and *Vitis rotundifolia*. Herbs may include *Chasmanthium laxum*, *Saccharum baldwinii*, *Carex jooirii*, *Osmunda cinnamomea*, and *Mitchella repens*. The liverwort *Pallavicinia lyellii* may be present.

At Oak Landing, Apalachicola National Forest, canopy dominants are *Quercus nigra* and *Pinus glabra* with *Quercus virginiana*, *Liquidambar styraciflua*, and *Betula nigra*. *Sabal minor*, *Carpinus caroliniana*, and *Ilex decidua* are the dominant shrubs, with *Crataegus marshallii*, *Vaccinium elliotii*, *Asimina parviflora*, *Amorpha fruticosa*, and *Viburnum dentatum*. Vines include *Toxicodendron radicans*, *Smilax bona-nox*, *Vitis rotundifolia*, *Bignonia capreolata*, and *Campsis radicans*. The most common herbs are *Chasmanthium laxum* and *Mitchella repens*. In the floodplain of the Ochlockonee River near Rock Bluff (Apalachicola National Forest), the canopy was dominated by *Pinus glabra*, *Quercus hemisphaerica*, and *Quercus nigra*, with *Liquidambar styraciflua* and *Quercus virginiana*. *Ilex decidua*, *Sebastiania fruticosa*, and *Chasmanthium latifolium* were also important (NatureServe Ecology unpubl. data). The exotic *Lygodium japonicum* may occur in stands of this association.

Dynamics: In Florida (Florida Natural Areas Inventory 1992b) this community is described as an alluvial floodplain flat inundated about 30% of the growing season.

Similar Associations:

Related Concepts:

- Floodplain Forest, Diamondleaf Oak/Spruce Pine Flat subtype (FNAI 1992b) ?
- IIA8c. Lowland Pine - Oak Forest (Allard 1990) ?
- Swamp chestnut oak-cherrybark oak-spruce pine (Wharton et al. 1982) ?

Classification Comments:

CONSERVATION RANKING & RARE SPECIES

GRank: G3G4 (2003-3-27): This association is thought to be restricted to natural levees of streams, both blackwater and brownwater, in the Coastal Plain of Georgia, Alabama, Mississippi, southern South Carolina, and Florida.

High-ranked species: No information

ELEMENT DISTRIBUTION

Range: This association occurs in Mississippi, Alabama, Florida, Georgia, and southern South Carolina.

Subnations: AL, FL, GA, MS, SC

TNC Ecoregions: 53:C, 56:C, 57:P

USFS Ecoregions: 232Ba:CCC, 232Bb:CC?, 232Bg:CCC, 232Bh:CCC, 232Bi:CC?, 232Bj:CCP, 232Bk:CCC, 232Bm:CC?, 232Bn:CC?, 232Bo:CC?, 232Bp:CC?, 232Br:CCC, 232Bs:CCC, 232Bu:CCP, 232Ca:CCP, 232Cb:CCP

Federal Lands: USFS (Apalachicola, Bienville?, Conecuh?, De Soto, Francis Marion?, Homochitto, Osceola?)

ELEMENT SOURCES

References: Allard 1990, FNAI 1992a, FNAI 1992b, NatureServe Ecology - Southeastern U.S. unpubl. data, Southeastern Ecology Working Group n.d., Wharton et al. 1982

WATER TUPELO FOREST

ELEMENT IDENTIFIERS

NVC association: *Nyssa aquatica* Forest

Database Code: CEGLO02419

Formation: Semipermanently flooded cold-deciduous forest (I.B.2.N.f)

Alliance: *Nyssa aquatica* - (*Taxodium distichum*) Semipermanently Flooded Forest Alliance (A.345)

ELEMENT CONCEPT

Summary: This semipermanently flooded water tupelo swamp forest is found in the Coastal Plain from Virginia south to Florida, west to Texas, and north in the Mississippi delta region to Missouri, Illinois, and Kentucky. Stands occur on permanently saturated soils on low, wet flats and sloughs, swales and backswamps, and the association is more common on floodplains of brownwater, rather than blackwater, rivers. Both organic and mineral soils may be present. The vegetation is dominated by dense, and occasionally pure, stands of *Nyssa aquatica* but often in association with *Taxodium distichum* (never very abundant in this type), *Liquidambar styraciflua*, *Planera aquatica*, *Nyssa biflora*, *Gleditsia aquatica*, *Fraxinus profunda*, and *Cephalanthus occidentalis*. The herbaceous layer is conspicuously sparse, and density is wholly dependent upon the extent and duration of flooding. Where water is permanent, herbaceous plants rely on substrates found on rotting logs, stumps, terraces, and buttresses of trees. Subcanopy density and forest tree recruitment are poor due to fluctuating water levels.

Environment: Stands of this association occur on permanently saturated soils on low, wet flats and sloughs, swales and backswamps, and the association is more common on floodplains of brownwater, rather than blackwater, rivers. Both organic and mineral soils may be present.

Vegetation: The vegetation is dominated by dense, and occasionally pure, stands of *Nyssa aquatica* but often in association with *Taxodium distichum* (never very abundant in this type), *Liquidambar styraciflua*, *Planera aquatica*, *Nyssa biflora*, *Gleditsia aquatica*, *Fraxinus profunda*, and *Cephalanthus occidentalis*. The herbaceous layer is conspicuously sparse, and density is wholly dependent upon the extent and duration of flooding. Where water is permanent, herbaceous plants rely on substrates found on rotting logs, stumps, terraces, and buttresses of trees. Some herbs which may be present at low densities on these elevated places include *Phanopyrum gymnocarpon*, *Pluchea camphorata*, *Boehmeria cylindrica*, *Rudbeckia laciniata*, *Sagittaria latifolia*, *Onoclea sensibilis*, *Triadenum walteri*, *Carex jorii*, *Carex glaucescens*, *Asclepias perennis*, *Saururus cernuus*, *Justicia ovata*, *Leersia lenticularis*, and others. Subcanopy density and forest tree recruitment are poor due to fluctuating water levels (TNC 1995a).

Dynamics: This is a climax wetland community. Flooding frequency is approximately 100% of years, and flooding duration is approximately 100% of the growing season. Seasonal flooding and permanent water require special adaptations by vegetation to exist in this extremely dynamic ecosystem. Many plants have highly specialized methods to facilitate acquisition and transport of oxygen during periods of prolonged inundation.

Similar Associations:

- *Taxodium distichum* - (*Nyssa aquatica*) / *Forestiera acuminata* - *Planera aquatica* Forest (CEGL002421) -- may resemble *Nyssa aquatica* Forest in habitats where most bald-cypress have been removed by logging and a few very old trees remain.
- *Taxodium distichum* - *Nyssa biflora* / *Berchemia scandens* - *Toxicodendron radicans* / *Woodwardia areolata* Forest (CEGL004429)

Related Concepts:

- *Nyssa aquatica* - *Taxodium distichum* swamp (Robertson et al. 1984) =
- *Taxodium* - *Nyssa aquatica* / *Rosa palustris* community (Voigt and Mohlenbrock 1964) B
- Baldcypress-Water Tupelo Series (Diamond 1993) B
- Eastern Broadleaf and Needleleaf Forests: 113: Southern Floodplain Forest (*Quercus-Nyssa-Taxodium*) (Kuchler 1964) B
- IIA4d. Tupelo Swamp (Allard 1990) B
- P1B3dII3a. *Nyssa aquatica* (Foti et al. 1994) ?
- Palustrine *Nyssa* sp. Series CP (Pyne 1994) ?
- Palustrine: Forested Wetland: Riparian (TNC 1985) B
- Palustrine: Palustrine Forested Wetland (Cowardin et al. 1979) B
- Tupelo Swamp (Oberholster 1993) B
- UNESCO FORMATION CODE: I.B.3e (UNESCO 1973) B
- Water Tupelo - Swamp Tupelo: 103 (Eyre 1980) B

Classification Comments: More work needs to be done to understand development of this community where the ranges of *Nyssa aquatica* and *Taxodium distichum* overlap, to determine the differences between this and a *Nyssa aquatica*-dominated forest that develops following logging of *Taxodium distichum*, and to determine the extent of geographic variation. Where bald-cypress and water tupelo ranges overlap, little is known about conditions which select for either or both species. Selective removal of bald-cypress

can shift dominance in mixed bald-cypress - water tupelo stands to favor water tupelo. Water tupelo seem to select transitional zones between permanent water and upland habitat and seldom occur as a dominant component of the canopy where inundation is semipermanent or permanent.

CONSERVATION RANKING & RARE SPECIES

GRank: G4G5 (2001-9-19): Depending on how historic distribution and abundance are factored into the rank, the rank could be considerably higher, perhaps a G3G4. Many stands have been extensively cleared.

High-ranked species: *Carex decomposita* (G3)

ELEMENT DISTRIBUTION

Range: This water tupelo swamp forest is found on the lower Atlantic Coastal Plain from southeastern Virginia to southeastern Georgia, the Gulf Coastal Plain from about Tallahassee, Florida, west to southeastern Texas, and the Mississippi River Alluvial Plain to southern Illinois and southeastern Missouri.

The type occurs on permanently saturated soils on low, wet flats and sloughs, swales, and back swamps and is more common on floodplains of brownwater, rather than blackwater, rivers. The range of water tupelo swamps has been greatly reduced within the last 100-150 years by ditching and draining for agriculture and logging. Water tupelo swamps today occur in areas where topographic and hydrologic conditions discouraged these practices. The removal of bald-cypress may actually select for water tupelo in swamps where both species occur. Historically, water tupelo swamps reached their northernmost limits in extreme southern Illinois.

Subnations: AL, AR, FL, GA, IL, KY, LA, MO, MS, NC, SC, TN, TX, VA

TNC Ecoregions: 40:C, 41:C, 42:C, 43:C, 44:C, 53:C, 56:C, 57:C

USFS Ecoregions: 222A:CC, 222C:CP, 222D:CP, 231Bc:CCC, 231E:C?, 232B:CC, 232C:CC, 232F:CC, 234A:CC

Federal Lands: DOD (Fort Benning?); DOE (Savannah River Site); NPS (Shiloh); USFS (Apalachicola?, Conecuh?, De Soto, Delta, Francis Marion, Kisatchie, Talladega)

ELEMENT SOURCES

References: Allard 1990, Ambrose 1990a, Applequist 1959, Burk 1977, Burns and Honkala 1990a, Burns and Honkala 1990b, Christensen 1988, Cowardin et al. 1979, Demaree 1932, Dennis 1988, Diamond 1993, Evans 1991, Ewel and Odum 1984b, Eyre 1980, Fleming et al. 2001, Foti 1994b, Foti et al. 1994, Klawitter 1962, Kuchler 1964, Mitsch and Gosselink 1993, NatureServe Ecology - Southeastern U.S. unpubl. data, Nelson 1986, Oberholster 1993, Peet et al. unpubl. data 2002, Penfound and Hall 1939, Pyne 1994, Radford and Martin 1975, Robertson et al. 1984, Schafale 2000, Schafale and Weakley 1990, Smith 1996a, Southeastern Ecology Working Group n.d., TNC 1985, TNC 1995a, UNESCO 1973, Voigt and Mohlenbrock 1964, Wharton 1989, Wharton et al. 1982, White and Anderson 1970, White and Madany 1978, Wieland 1994b, Wieland 2000b

ATLANTIC COASTAL PLAIN SOUTHERN DEPRESSION POND SHORE

POND-CYPRESS / (SWAMP BLACKGUM) / SWAMP DOGHOBLE - SHINING FETTERBUSH - WAX-MYRTLE DEPRESSION FOREST

ELEMENT IDENTIFIERS

NVC association: *Taxodium ascendens* / (*Nyssa biflora*) / *Leucothoe racemosa* - *Lyonia lucida* - *Morella cerifera* Depression Forest

Database Code: CEGLO07420

Formation: Seasonally flooded cold-deciduous forest (I.B.2.N.e)

Alliance: *Taxodium ascendens* Seasonally Flooded Forest Alliance (A.336)

ELEMENT CONCEPT

Summary: This forested community occurs in poorly drained to permanently wet depressions surrounded by upland or saturated wetland communities, primarily pine flatwoods, but it rarely can occur in floodplain depressions of blackwater rivers (i.e., Styx River, Baldwin County, Alabama). Examples often have a characteristic dome-shaped appearance resulting from the largest, highest trees occurring in the center with smaller trees around the margins. It occurs in peaty depressions on the Coastal Plain from North Carolina and South Carolina through Georgia, Florida, Alabama, and Mississippi to eastern Louisiana. This community occurs on acidic sand overlain by an organic layer. Size ranges from one to several hundred acres. *Taxodium ascendens* is the most conspicuous tree in the canopy; *Pinus elliottii* var. *elliottii* can sometimes be present or codominant. *Nyssa biflora* frequently occurs in the subcanopy but may occur as a canopy species. Shrubs occur on hummocks which form around cypress buttresses and knees. This stratum may be made up of one or several species of *Leucothoe racemosa*, *Cyrilla racemiflora*, *Itea virginica*, *Lyonia lucida*, *Litsea aestivalis*, *Hypericum fasciculatum*, *Clethra alnifolia*, *Morella cerifera* (= *Myrica cerifera*), *Ilex cassine*, *Cephalanthus occidentalis*, *Persea palustris*, and more. Shrubs form a distinct understory with increasing distance from the center depression. *Carex* spp. and *Sphagnum* spp. occur on the thin, peaty muck. Other ground cover is scattered on hummocks, and includes *Woodwardia virginica*, *Saururus cernuus*, and *Lachnanthes caroliana*. Density increases with proximity to the community's edge. *Pieris phillyreifolia*, an epiphytic shrub-vine may occur on the *Taxodium ascendens* trees, and *Tillandsia usneoides*, are often abundant in some parts of the range.

Environment: This forested community occurs in poorly drained to permanently wet depressions surrounded by upland or saturated wetland communities, primarily pine flatwoods, but it rarely can occur in floodplain depressions of blackwater rivers (i.e., Styx River, Baldwin County, Alabama) (NatureServe Ecology unpubl. data). Pools of stagnant acidic water stand in these depressions, with deepest water in the center (1-4 feet deep) and shallower near the margins. The outer edges of the community may dry down completely in the spring. Sites in north-central Florida are underlain by an impervious clay pan which impedes drainage and traps precipitation. It occurs on acidic sand overlain by an organic layer. Size ranges from one to several hundred acres (Monk and Brown 1965, Clewell 1971). Soil series in Florida can include Bladen, Coxville, Bayboro, Portsmouth, and Rutledge (Monk and Brown 1965).

Vegetation: *Taxodium ascendens* is the most conspicuous tree in the canopy. *Nyssa biflora* frequently occurs in the subcanopy (Monk and Brown 1965, Clewell 1971, 1981), but may occur as a canopy species. Shrubs occur on hummocks which form around cypress buttresses and knees. This stratum may be made up of one or several species of *Leucothoe racemosa*, *Cyrilla racemiflora*, *Itea virginica*, *Lyonia lucida*, *Hypericum fasciculatum*, *Clethra alnifolia*, *Morella cerifera* (= *Myrica cerifera*), *Ilex cassine*, *Cephalanthus occidentalis*, *Persea palustris*, and more. Shrubs form a distinct understory with increasing distance from the center depression (Monk and Brown 1965, Clewell 1971). *Carex* spp. and *Sphagnum* spp. occur on the thin, peaty muck. Other ground cover is scattered on hummocks, and includes *Woodwardia virginica*, *Saururus cernuus*, and *Lachnanthes caroliniana*. Density increases with proximity to the community's edge. *Pieris phillyreifolia*, an epiphytic shrub-vine may occur on the *Taxodium ascendens* trees, and *Tillandsia usneoides*, are often abundant in some parts of the range.

Dynamics: Species composition appears to be related to soil calcium and pH levels as well as maximum flooding. The importance of *Taxodium ascendens* increases with depth of flooding while *Pinus elliottii*, *Nyssa biflora*, *Acer rubrum*, and *Morella cerifera* decrease in importance; the reverse pattern seems to be true with increases in calcium levels (Monk and Brown 1965).

Likely due to the scarcity of undergrowth and inability to carry fire, fire is irregular - at least in the center - of this community (Clewell 1971, 1981). Wharton (1978) indicates this community has a 50- to 150-year fire interval, but that once a fire is started it can burn the peat for long periods (up to 50 years in the Okefenokee Swamp). Although the center of this community may have a fire interval of 100 to 150 years, the periphery burns much more frequently (3 to 5 years at outer edge) due to the shorter hydroperiod (FNAI 1990). Charcoal commonly found on *Taxodium ascendens* trunks indicates fires that burn through adjacent communities do reach the cypress. *Taxodium ascendens* can survive light fires, but peat fires can kill the trees.

Fire is an important determinant of successional dynamics and is in turn largely determined by hydroperiod. In the absence of occasional, light fire, this community may succeed to *Gordonia lasianthus* - *Magnolia virginiana* - *Persea palustris* / *Sphagnum* spp. Forest (CEGL007044) (Monk and Brown 1965, FNAI 1990). When peat fires occur, this community may be transformed to a treeless pond. One theory links the successional status of this community to that of *Nyssa biflora* / *Itea virginica* - *Cephalanthus occidentalis* Depression Forest (CEGL007434); calcium favors the growth of *Nyssa biflora* over that of *Taxodium ascendens*, and the *Nyssa biflora* itself acts as a calcium pump, thus generating a positive feedback that favors the swamp tupelo-dominated community (Clewell 1971). This *Nyssa biflora*-dominated community also occurs in depressions with longer, and/or less fluctuating, hydroperiods. Some *Nyssa biflora*-dominated and codominated swamps may be the result of past cypress logging.

Similar Associations:

- *Taxodium ascendens* / *Ilex myrtifolia* / *Carex (striata, turgescens)* Stringer Forest (CEGL007419) -- occurs in and along diffuse waterways, is less acidic, and experiences fire more frequently.

Related Concepts:

- Cypress Pond (Wharton 1978) ?
- Forest, Cypress/Gum Pond (Ambrose 1990a) B
- IIA3a. Pondcypress Dome and Swamp Forest (Allard 1990) ?
- Nonriverine Swamp Forest (Oberholster 1993) ?
- Pondcypress (23) (USFS 1988) ?
- Pondcypress: 100 (Eyre 1980) B
- Small Depression Swamp (Mixed Subtype) (Schafale 2000) ?

Classification Comments:

CONSERVATION RANKING & RARE SPECIES

GRank: G3 (2001-1-23): This community is fairly widespread in occurrence in the East Gulf Coastal Plain, Florida Peninsula, and southern Atlantic Coastal Plain. It occurs in what were historically fire-maintained landscapes, and most occurrences nowadays have fire-suppressed conditions. Additionally, as a community which occurred in longleaf pine flatwood landscapes, this community has suffered from the extreme reduction in longleaf and associated communities.

High-ranked species: *Litsea aestivalis* (G3), *Pieris phillyreifolia* (G3)

ELEMENT DISTRIBUTION

Range: This community occurs in peaty depressions on the Coastal Plain from North Carolina and South Carolina through Georgia, Florida, Alabama, and Mississippi to eastern Louisiana.

Subnations: AL, FL, GA, LA, MS, NC, SC

TNC Ecoregions: 53:C, 55:C, 56:C, 57:C

USFS Ecoregions: 232Bf:CCC, 232Ca:CCC, 232Cb:CCC, 232Ce:CCC, 232Dc:CCC

Federal Lands: USFS (Apalachicola, Conecuh, De Soto, Francis Marion, Ocala, Osceola)

ELEMENT SOURCES

References: Allard 1990, Ambrose 1990a, Clewell 1971, Clewell 1981, Eyre 1980, FNAI 1990, FNAI 1992b, Monk and Brown 1965, NatureServe Ecology - Southeastern U.S. unpubl. data, Nelson 1986, Oberholster 1993, Schafale 2000, Schafale and Weakley 1990, Smith 1994a, Southeastern Ecology Working Group n.d., USFS 1988, Wharton 1978, Wharton et al. 1976

POND-CYPRESS / MYRTLE DAHOON DEPRESSION FOREST

ELEMENT IDENTIFIERS

NVC association: *Taxodium ascendens* / *Ilex myrtifolia* Depression Forest

Database Code: CEGL007418

Formation: Seasonally flooded cold-deciduous forest (I.B.2.N.e)

Alliance: *Taxodium ascendens* Seasonally Flooded Forest Alliance (A.336)

ELEMENT CONCEPT

Summary: This forest, dominated by a moderate to dense canopy of *Taxodium ascendens* over *Ilex myrtifolia*, occurs in depressions on the Coastal Plain from southern North Carolina south to panhandle and peninsular Florida, and west to Alabama and Louisiana. Other characteristic species in the canopy, which can occasionally share dominance with *Taxodium ascendens* are *Nyssa biflora* and (from southeastern South Carolina south) *Pinus elliottii* var. *elliottii*. Typical occurrences have a mostly closed canopy, little understory with shrubs and herbs established on fallen logs, tree bases or areas where the substrate is elevated. Deep areas may have rooted aquatics and surface water will be present for extended periods of the year.

Environment: This forest occurs in depressions on the Coastal Plain from southern North Carolina south to panhandle and peninsular Florida, and west to Alabama and Louisiana. Long hydroperiods (probably exceeding 250 days) are necessary for maintenance of the community; sites usually are underlain by a clay lens. The community occurs in very low topographic positions, almost always in small coastal plain depressions and Carolina bays. Possibly may occur in low spots in a flatwoods environment. Two occurrences in South Carolina were found on Byars loam (clayey kaolinitic thermic Umbric Paleaquult) and Rembert loam (clayey kaolinitic thermic Typic Ochraquult) (C. Aulbach-Smith pers. comm.) soil series, and one in Osceola County, Florida, was on a Typic Humaquept (Huck 1987). The following is from Wharton (1978): "The soil of cypress ponds is basic, pH 5.5. Phosphorus is extremely low. The following are the mean figures for five environmental variables of cypress ponds as given by Monk (1968) in ppm: Calcium 185, magnesium 55.2, potassium 15.8, phosphorus 1.2, moisture 35." Most occurrences probably are underlain by a clay lens, especially when they occur in Carolina bays.

Vegetation: Stands are dominated by a moderate to dense canopy of *Taxodium ascendens* over *Ilex myrtifolia*. Other characteristic species in the canopy are *Nyssa biflora* and (from southeastern South Carolina south) *Pinus elliottii* var. *elliottii*. Other common species in this community are *Nyssa biflora*, *Magnolia virginiana*, *Acer rubrum*, *Persea palustris*, *Cephalanthus occidentalis*, *Cyrilla racemiflora*, *Clethra alnifolia*, *Lyonia lucida*, *Dulichium arundinaceum*, *Osmunda cinnamomea*, *Pontederia cordata*, *Boehmeria cylindrica*, *Triadenum* spp., *Rhynchospora macrostachya*, *Rhynchospora inundata*, *Carex glaucescens*, *Carex* spp., *Juncus* spp., *Polygonum* spp., and *Hydrocotyle* spp. Floating aquatic species include *Brasenia schreberi*, *Nymphoides* spp., *Nuphar lutea*, *Cabomba caroliniana*, *Utricularia* spp., and *Potamogeton* spp. *Pinus elliottii* is present from southeast South Carolina south. A typical occurrence will have a mostly closed canopy, little understory with shrubs and herbs established on fallen logs, tree bases or areas where the substrate is elevated. Deep areas will have rooted aquatics and water will be present on the surface mostly throughout.

Dynamics: Fires probably are very infrequent since this community is nearly permanently flooded. Water levels probably are fairly steady within occurrences year-round. Succession within this community may lead ultimately to development of some sort of bay forest, i.e., forests dominated by *Magnolia virginiana*, *Persea palustris*, and *Gordonia lasianthus*.

Similar Associations:

- *Taxodium ascendens* / (*Nyssa biflora*) / *Leucothoe racemosa* - *Lyonia lucida* - *Morella cerifera* Depression Forest (CEGL007420) - closely related forest either lacking or with considerably lower abundance of *Ilex myrtifolia*.
- *Taxodium ascendens* / *Ilex myrtifolia* / *Hypericum myrtifolium* / *Lobelia floridana* - *Polygala cymosa* Woodland (CEGL004959) -- woodland form, with a circumscribed narrower range.

Related Concepts:

- Dome Swamp, Cypress Dome subtype (FNAI 1992b) B
- Forest, Cypress/Gum Pond (Ambrose 1990a) B
- IIA10a. Pond Cypress Forest (Allard 1990) B
- Oligotrophic Seasonally Flooded Forest (Rawinski 1992) B
- Pond Cypress (23) (USFS 1988) ?
- Pond Cypress Pond Forest (Oberholster 1993) ?
- Pond Cypress: 100 (Eyre 1980) ?
- Small Depression Swamp (Cypress Dome Subtype) (Schafale 2000) ?

Classification Comments:

CONSERVATION RANKING & RARE SPECIES

GRank: G3? (1997-8-15): No information

High-ranked species: *Hypericum harperi* (G3), *Litsea aestivalis* (G3), *Myriophyllum laxum* (G3), *Polygonum hirsutum* (G3G4), *Rhexia aristosa* (G3), *Rhynchospora pleiantha* (G3)

ELEMENT DISTRIBUTION

Range: This forest occurs in the Coastal Plain from southern North Carolina south to panhandle and peninsular Florida, and west to Alabama and Louisiana.

Subnations: AL, FL, GA, LA?, MS, NC, SC

TNC Ecoregions: 53:C, 55:C, 56:C, 57:C

USFS Ecoregions: 232Bh:CCC, 232Br:CCC, 232Ca:CCC, 232Dc:CCC

Federal Lands: DOD (Fort Stewart); USFS (Apalachicola, Conecuh, Croatan, De Soto, Francis Marion, Ocala, Osceola)

ELEMENT SOURCES

References: Allard 1990, Allard et al. 1990, Ambrose 1990a, Aulbach-Smith pers. comm., Bennett and Nelson 1991, Eyre 1980, FNAI 1992a, FNAI 1992b, Faircloth 1971, Huck 1987, Monk 1968, Nelson 1986, Oberholster 1993, Rawinski 1992, Schafale 2000, Schafale and Weakley 1990, Smith 1996a, South Carolina Wildlife and Marine Resources Department 1984, Southeastern Ecology Working Group n.d., USFS 1988, Wharton 1978

SWAMP BLACKGUM / VIRGINIA-WILLOW - BUTTONBUSH DEPRESSION FOREST

ELEMENT IDENTIFIERS

NVC association: *Nyssa biflora* / *Itea virginica* - *Cephalanthus occidentalis* Depression Forest

Database Code: CEGLO07434

Formation: Seasonally flooded cold-deciduous forest (I.B.2.N.e)

Alliance: *Nyssa (aquatica, biflora, ogeche)* Pond Seasonally Flooded Forest Alliance (A.324)

ELEMENT CONCEPT

Summary: This community occupies peaty or mucky, acidic, semipermanently wet depressions in the Atlantic and East Gulf coastal plains. This community is strongly dominated by *Nyssa biflora*. Other bottomland species, including *Taxodium distichum* and *Taxodium ascendens*, may also be present, but combined usually contribute less than 30% of the canopy. Shrubs are scarce to scattered on hummocks and become more common with peat accumulation. Shrub species include *Itea virginica* and *Cephalanthus occidentalis*, with *Clethra alnifolia*, *Lyonia lucida*, *Cliftonia monophylla*, and *Cyrilla racemiflora* being common in the East Gulf and Atlantic coastal plains. Floating logs and stumps provide habitat for the sparse herbaceous stratum. Species include *Woodwardia virginica*, *Woodwardia areolata*, *Osmunda cinnamomea*, *Eriocaulon* spp., *Xyris* spp., *Rhynchospora* spp., *Schoenoplectus* spp. (= *Scirpus* spp.), and *Juncus* spp. The moderately to strongly acidic sandy soils are overlain by organic muck and leaf litter. This community occurs in depressions on the Coastal Plain of Virginia, North Carolina, South Carolina, Georgia, Florida, Alabama, and Mississippi; and sparingly on the Piedmont of South Carolina, Georgia, and Alabama.

Environment: This community occupies peaty or mucky, acidic, semipermanently wet depressions in the Atlantic and East Gulf coastal plains. This forest receives hydrologic inputs through seepage, and where associated with small drainages, occasional flooding. The moderately to strongly acidic sandy soils are overlain by organic muck and leaf litter, and generally underlain by clay (Clewell 1971, Wharton et al. 1976, 1982, Smith 1995a).

Vegetation: This community is strongly dominated by *Nyssa biflora*. Other bottomland species, including *Taxodium distichum* and *Taxodium ascendens*, may occur but combined usually contribute less than 30% of the canopy. Shrubs are scarce to scattered on hummocks and become more common with peat accumulation. Shrub species include *Itea virginica* and *Cephalanthus occidentalis*, with *Clethra alnifolia*, *Lyonia lucida*, *Cliftonia monophylla*, and *Cyrilla racemiflora* being common in the East Gulf and Atlantic coastal plains. On Apalachicola National Forest at Morrison Hammock, *Magnolia virginiana*, *Gordonia lasianthus*, *Ilex coriacea*, *Ilex myrtifolia*, *Pinus taeda*, and *Ilex cassine* were also present at low cover values (NatureServe Ecology unpubl. data). Floating logs and stumps provide habitat for the sparse herbaceous stratum. Species include *Woodwardia virginica*, *Woodwardia areolata*, *Osmunda cinnamomea*, *Eriocaulon* spp., *Xyris* spp., *Rhynchospora* spp., *Schoenoplectus* spp. (= *Scirpus* spp.), and *Juncus* spp.

Dynamics: Due to the increased hydroperiod, this community burns less frequently than cypress swamps (Wharton et al. 1976); fire is also more destructive to *Nyssa biflora* than it is to *Taxodium ascendens* (Clewell 1971, 1981).

Nyssa biflora increases the soil calcium content, and calcium favors the growth of *Nyssa biflora* over that of *Taxodium ascendens*. Therefore, pond-cypress swamps which contain *Nyssa biflora* may succeed to a *Nyssa biflora*-dominated community (Clewell 1971, 1981). Another theory suggests that blackgum would succeed cypress in the absence of peat accumulation (Wharton et al. 1976), presumably due to the tolerance of *Nyssa biflora* for the long hydroperiod. In addition, *Nyssa biflora* may replace *Taxodium ascendens* in the absence of fire (Nelson 1986). Some *Nyssa biflora*-dominated swamps may be a result of past *Taxodium ascendens* logging.

Similar Associations:

- *Nyssa biflora* - *Quercus laurifolia* / *Sphagnum* spp. Depression Forest (CEGL007390) -- of the Western Gulf Coastal Plain is a drier community, being flooded for approximately 4 to 6 months of the year; it is codominated by *Quercus laurifolia*, often with other bottomland oaks.
- *Nyssa biflora* / *Ilex myrtifolia* / *Carex glaucescens* - *Eriocaulon compressum* Forest (CEGL004720) -- of dome swamps.
- *Taxodium ascendens* / (*Nyssa biflora*) / *Leucothoe racemosa* - *Lyonia lucida* - *Morella cerifera* Depression Forest (CEGL007420) - of the Atlantic Coastal Plain and Eastern Gulf Coastal Plain is dominated by pond cypress; when it occurs, *Nyssa biflora* is generally in the subcanopy. Within its range, this community frequently borders it and occurs on slightly higher ground.

Related Concepts:

- Forest, Cypress/Gum Pond (Ambrose 1990a) B
- IIA10b. Swamp Tupelo Pond Forest (Allard 1990) B
- Nonriverine Swamp Forest (Oberholster 1993) B
- Small Depression Swamp (Mixed Subtype) (Schafale 2000) ?
- Water Tupelo - Swamp Tupelo: 103 (Eyre 1980) B
- Water Tupelo-Swamp Tupelo (USFS 1988) ?

Classification Comments: The closed *Nyssa biflora* canopy in this forest seems to allow less light penetration than in *Taxodium* swamps (Clewell 1971, Wharton et al. 1976, 1982). This community can be distinguished from other peatland communities by the dominance of *Nyssa biflora*, typically a swamp species (Schafale and Weakley 1990).

CONSERVATION RANKING & RARE SPECIES

GRank: G3G4 (2002-10-15): This is an uncommon but not inherently rare forest type. It is widely distributed, but is restricted to a limited set of environmental conditions. Some examples are protected on public land. Occurrences are directly threatened by hydrologic alteration. Many examples are poorly buffered and suffer from upslope land-use change, timber removal, or conversion of upslope forests to managed forest types.

High-ranked species: *Oxypolis canbyi* (G2), *Rhexia aristosa* (G3), *Rhynchospora inundata* (G3G4)

ELEMENT DISTRIBUTION

Range: This community occurs in depressions on the Coastal Plain of Virginia, North Carolina, South Carolina, Georgia, Florida, Alabama, and Mississippi, and sparingly on the Piedmont of South Carolina, Georgia, and Alabama. It may also occur in the eastern portions of Louisiana.

Subnations: AL, FL, GA, LA, MS, NC, SC, VA?

TNC Ecoregions: 43:P, 52:P, 53:C, 56:C, 57:C

USFS Ecoregions: 232Bh:CCC, 232D:CC, 232F:CC

Federal Lands: DOD (Fort Benning); USFS (Apalachicola, Conecuh, De Soto, Francis Marion, Holly Springs?, Oconee?, Tombigbee?, Tuskegee?); USFWS (Eufaula)

ELEMENT SOURCES

References: ALNHP 2002, Allard 1990, Ambrose 1990a, Burns and Honkala 1990b, Clewell 1971, Clewell 1981, Eyre 1980, FNAI 1992b, NatureServe Ecology - Southeastern U.S. unpubl. data, Nelson 1986, Oberholster 1993, Peet et al. unpubl. data 2002, Schafale 2000, Schafale and Weakley 1990, Smith 1995a, Smith 1996a, Southeastern Ecology Working Group n.d., USFS 1988, Wharton et al. 1976, Wharton et al. 1982, Wieland 1994b

SWITCHGRASS - (WHITE BLUESTEM, CHALKY BLUESTEM) - LONGLEAF THREE-AWN HERBACEOUS VEGETATION

ELEMENT IDENTIFIERS

NVC association: *Panicum virgatum* - *Andropogon (capillipes, glaucopsis)* - *Aristida palustris* Herbaceous Vegetation

Database Code: CEGL004100

Formation: Seasonally flooded temperate or subpolar grassland (V.A.5.N.k)

Alliance: *Aristida palustris* - *Andropogon (capillipes, glaucopsis)* - *Rhynchospora* spp. Seasonally Flooded Herbaceous Alliance (A.1364)

ELEMENT CONCEPT

Summary: These are drier Coastal Plain limesink (and other depressional) ponds of the southern Atlantic and East Gulf coastal plains, dominated by *Aristida palustris*, *Andropogon capillipes* ('wetland variant'), *Andropogon glaucopsis*, *Andropogon virginicus*, *Andropogon gyrans* var. *stenophyllus* (= *Andropogon perangustatus*), *Schizachyrium scoparium* var. *scoparium*, and also typically with such species as *Saccharum giganteum*, *Sphagnum* spp., and *Centella erecta*.

Environment: This vegetation occupies the drier zones of Coastal Plain ponds of the southern Atlantic and East Gulf coastal plains.

Vegetation: Stands are dominated by *Aristida palustris*, *Andropogon capillipes* ("wetland variant"), *Andropogon glaucopsis*, *Andropogon virginicus*, *Andropogon gyrans* var. *stenophyllus* (= *Andropogon perangustatus*), *Schizachyrium scoparium* var. *scoparium*, and also typically with such species as *Saccharum giganteum*, *Sphagnum* spp., and *Centella erecta*.

Dynamics: No information

Similar Associations:**Related Concepts:**

- Vernal Pool Meadow/Savanna (Typic Subtype) (Schafale 2000) ?

Classification Comments: Coastal Plain pond communities need reassessment, with additional information from the Deep South and Delmarva-New Jersey-New England.

CONSERVATION RANKING & RARE SPECIES

GRank: G2? (1998-1-11): This community is restricted in distribution and extent. Most occurrences are degraded by one or more of the following factors: fire exclusion, off-road vehicles, water-table reductions, residential development and shore conversion.

High-ranked species: No information

ELEMENT DISTRIBUTION

Range: Restricted to the southern Atlantic and East Gulf coastal plains of the United States.

Subnations: AL, FL, GA, LA?, NC, SC

TNC Ecoregions: 53:C, 56:C, 57:C

USFS Ecoregions: 232Br:CCC, 232Cb:CCC, 232Ch:CCC

Federal Lands: DOD (Fort Stewart?, Sunny Point); USFS (Concuh, Croatan, Francis Marion)

ELEMENT SOURCES

References: Glitzenstein and Streng 2004, Nelson 1986, Schafale 2000, Schafale and Weakley 1990, Southeastern Ecology Working Group n.d.

TITI - SHINING FETTERBUSH SHRUBLAND**ELEMENT IDENTIFIERS**

NVC association: *Cyrilla racemiflora* - *Lyonia lucida* Shrubland

Database Code: CEG003844

Formation: Saturated temperate broad-leaved evergreen shrubland (III.A.2.N.i)

Alliance: *Cyrilla racemiflora* - *Ilex coriacea* - (*Cliftonia monophylla*) Saturated Shrubland Alliance (A.802)

ELEMENT CONCEPT

Summary: This community occupies a marginal zone (sometimes very narrow, sometimes broader) of Coastal Plain ponds. Occasionally, this zone may dominate entire small depressions. *Cyrilla racemiflora* and *Lyonia lucida* usually dominate. An example at Fort Gordon, Georgia, contains the shrubs *Lyonia lucida*, *Morella cerifera* (= *Myrica cerifera*), and *Viburnum nudum* var. *nudum*, along with the herbs and low shrubs *Dulichium arundinaceum*, *Eupatorium* sp., *Hypericum* sp., *Triadenum* sp., *Ludwigia* sp., *Xyris* sp., and *Scirpus cyperinus*?. An example on Apalachicola National Forest includes *Clethra alnifolia*, *Pieris phillyreifolia*, and *Ilex myrtifolia*.

Environment: No information

Vegetation: *Cyrilla racemiflora* and *Lyonia lucida* usually dominate this marginal zone of Coastal Plain ponds. An example at Fort Gordon, Georgia, contains the shrubs *Lyonia lucida*, *Morella cerifera* (= *Myrica cerifera*), and *Viburnum nudum* var. *nudum*, along with the herbs and low shrubs *Dulichium arundinaceum*, *Eupatorium* sp., *Hypericum* sp., *Triadenum* sp., *Ludwigia* sp., *Xyris* sp., and *Scirpus cyperinus*?.

Dynamics: No information

Similar Associations:

- *Cyrilla racemiflora* - *Cliftonia monophylla* Shrubland (CEG003847)

Related Concepts:

- Shrub Bog (Wharton 1978) B
- Small Depression Shrub Border (Schafale 2000) ?

Classification Comments:**CONSERVATION RANKING & RARE SPECIES**

GRank: G3? (2001-1-30): The community type is a zonal component of southeastern Coastal Plain depressional ponds. These ponds in general have suffered from drainage, fragmentation of the landscape in which they occur, and fire suppression. Fire is an important natural process which formally affected the structure and composition of this community type, and is often now missing from remaining occurrences. Acreage of this type was always relatively small, but is now further reduced.

High-ranked species: No information

ELEMENT DISTRIBUTION

Range: This community is found in the Coastal Plain of the United States potentially from the Carolinas to Louisiana(?).

Subnations: AL, FL, GA, LA?, MS, NC, SC

TNC Ecoregions: 53:C, 56:C, 57:C

USFS Ecoregions: 232Ba:CCP, 232Be:CCP, 232Bg:CCC, 232Bh:CCP, 232Bj:CCC, 232Bk:CCP, 232Bn:CCP, 232Bo:CCP, 232Bp:CCP, 232Bq:CCC, 232Br:CCC, 232Bu:CCP, 232Bv:CCC, 232Ca:CCC, 232Cb:CCC, 232Cc:CCC, 232Cd:CCC, 232Ce:CCC, 232Cf:CCP, 232Dc:CCC

Federal Lands: DOD (Fort Gordon); USFS (Apalachicola, Conecuh, Croatan, Francis Marion?)

ELEMENT SOURCES

References: NatureServe Ecology - Southeastern U.S. unpubl. data, Schafale 2000, Southeastern Ecology Working Group n.d., Wharton 1978

VIRGINIA CHAINFERN / TOOTHED PEATMOSS HERBACEOUS VEGETATION

ELEMENT IDENTIFIERS

NVC association: *Woodwardia virginica* / *Sphagnum cuspidatum* Herbaceous Vegetation

Database Code: CEGLO04475

Formation: Seasonally flooded temperate perennial forb vegetation (V.B.2.N.h)

Alliance: *Woodwardia virginica* Seasonally Flooded Herbaceous Alliance (A.1713)

ELEMENT CONCEPT

Summary: This generally defined association covers seasonally flooded wetland depressions, often strongly dominated by *Woodwardia virginica*, which occur in acid sands of the Coastal Plain. Vegetation is tall, up to 1.5 m in height. Additional associates include *Triadenum virginicum*, *Carex striata*, *Hypericum mutilum*, and *Decodon verticillatus*. Woody associates typically occur at the periphery of the pond, and may include scattered and stunted individuals of *Acer rubrum*, *Pinus taeda*, *Liquidambar styraciflua*, *Clethra alnifolia*, *Rhododendron viscosum*, or *Vaccinium corymbosum*. More information is needed on this vegetation type. It is attributed to various states in the Atlantic Coastal Plain from Delaware to Florida.

Environment: Stands of this generally defined association are seasonally flooded wetland depressions or ponds which occur in acid sands of the Coastal Plain.

Vegetation: Stands of this generally defined association are often strongly dominated by *Woodwardia virginica*. The vegetation may be tall, reaching up to 1.5 meters in height. Additional associates include *Triadenum virginicum*, *Carex striata*, *Hypericum mutilum*, and *Decodon verticillatus*. Woody associates typically occur at the periphery of the pond or depression, and may include scattered and stunted individuals of *Acer rubrum*, *Pinus taeda*, *Liquidambar styraciflua*, *Clethra alnifolia*, *Rhododendron viscosum*, or *Vaccinium corymbosum*. In addition, *Sphagnum* mosses (e.g., *Sphagnum cuspidatum*, *Sphagnum palustre*) are also typical components. More information is needed on this vegetation type.

Dynamics: No information

Similar Associations:

Related Concepts:

- Small Depression Drawdown Meadow/Savanna (Boggy Pool Subtype) (Schafale 2000) ?

Classification Comments:

CONSERVATION RANKING & RARE SPECIES

GRank: G2? (1997-12-1): No information

High-ranked species: No information

ELEMENT DISTRIBUTION

Range: This association is attributed to various states in the Atlantic Coastal Plain from Delaware to Florida.

Subnations: DE, FL, GA, MD, NC, SC, VA?

TNC Ecoregions: 53:P, 55:C, 56:C, 57:C, 58:C

USFS Ecoregions: 232Bf:CC?, 232Bz:CC?, 232Ca:CCP, 232Cb:CCC, 232Ce:CCC, 232Ch:CCC, 232Ga:CCC

Federal Lands: USFS (Francis Marion)

ELEMENT SOURCES

References: Berdine and Gould 1999, Glitzenstein and Streng 2004, Laessle 1942, Schafale 2000, Schafale and Weakley 1990, Southeastern Ecology Working Group n.d.

ATLANTIC COASTAL PLAIN SOUTHERN TIDAL WOODED SWAMP

SWAMP BLACKGUM - (WATER TUPELO, BALD-CYPRESS) TIDAL FOREST

ELEMENT IDENTIFIERS

NVC association: *Nyssa biflora* - (*Nyssa aquatica*, *Taxodium distichum*) Tidal Forest

Database Code: CEGLO04484

Formation: Tidal cold-deciduous forest (I.B.2.N.h)

Alliance: *Nyssa biflora* - (*Nyssa aquatica*, *Taxodium distichum*) Tidal Forest Alliance (A.357)

ELEMENT CONCEPT

Summary: This broadly defined association accommodates tidally flooded forests in lower, estuarine reaches of brownwater and blackwater rivers in the Outer Coastal Plain (tidewater), and also along estuarine shores. It may require subdivision as more information becomes available. Flooding of these environments can be either lunar-tidal or wind-tidal, and can be affected as well by riverine flooding events. The trees often have a stressed appearance, and the herbaceous layer usually is well-developed and more species-rich than in most non-tidal swamps, possibly as a result of the tidal nutrient input. Various combinations of *Nyssa biflora*, *Taxodium distichum*, and *Nyssa aquatica* usually dominate the canopy. In addition, *Liquidambar styraciflua* may be present. On blackwater rivers, *Nyssa aquatica* is often an indicator of tidal condition, presumably because it requires the higher nutrients provided by tidal flooding. Other species common in tidal situations, such as *Morella cerifera* (= *Myrica cerifera*), *Lilaeopsis carolinensis*, *Peltandra virginica*, *Thelypteris palustris* var. *pubescens*, *Osmunda regalis* var. *spectabilis*, and *Rosa palustris*, are often common. Typical species of non-tidal swamps, such as *Quercus lyrata*, *Carya aquatica*, *Quercus phellos*, *Smilax laurifolia*, *Ilex glabra*, *Lyonia lucida*, *Woodwardia virginica*, *Sphagnum* spp., *Chamaecyparis thuyoides*, *Cyrilla racemiflora*, and others, are absent.

Environment: These tidally flooded forests are found in lower, estuarine reaches of brownwater and blackwater rivers in the Outer Coastal Plain (tidewater), and also along estuarine shores. Flooding can be either lunar-tidal or wind-tidal, and can be affected as well by riverine flooding events.

Vegetation: The canopy of stands of this vegetation type are usually dominated by various combinations of *Nyssa biflora*, *Taxodium distichum*, and *Nyssa aquatica*. In addition, *Liquidambar styraciflua* may be present (Wharton 1978). On blackwater rivers, *Nyssa aquatica* is often an indicator of tidal condition, presumably because it requires the higher nutrients provided by tidal flooding. Wharton (1978) cites *Persea palustris*, *Forestiera acuminata*, *Sabal minor*, *Salix nigra*, *Cornus amomum*, *Planera aquatica*, *Alnus serrulata*, and *Viburnum obovatum* as additional woody components. Other species common in tidal situations, such as *Morella cerifera* (= *Myrica cerifera*), *Lilaeopsis carolinensis*, *Peltandra virginica*, *Thelypteris palustris* var. *pubescens*, *Osmunda regalis* var. *spectabilis*, and *Rosa palustris*, are often common (Schafale and Weakley 1990). Some additional low woody and herbaceous species cited by Wharton (1978) include *Aletris aurea*, *Decumaria barbara*, *Onoclea sensibilis*, *Arisaema dracontium*, *Justicia ovata*, *Clematis crispa*, *Ipomoea pandurata*, *Physostegia* sp., and *Leersia* sp. Typical species of non-tidal swamps, such as *Quercus lyrata*, *Carya aquatica*, *Quercus phellos*, *Smilax laurifolia*, *Ilex glabra*, *Lyonia lucida*, *Woodwardia virginica*, *Sphagnum* spp., *Chamaecyparis thuyoides*, *Cyrilla racemiflora*, and others, are absent.

Dynamics: The trees in stands of this community often have a stressed appearance, and the herbaceous layer usually is well-developed and more species-rich than in related non-tidal swamps, possibly as a result of the tidal nutrient input.

Similar Associations:

Related Concepts: No information

Classification Comments: There may be a necessity to recognize brownwater and blackwater variants in the Atlantic Coastal Plain, as well as distinct type(s) along the Gulf Coast.

CONSERVATION RANKING & RARE SPECIES

GRank: G3G4 (2000-12-28): As currently defined, this is a general type which may require subdivision as more information becomes available.

High-ranked species: No information

ELEMENT DISTRIBUTION

Range: This vegetation is found along the Atlantic and Gulf coastal plains from Mississippi and Alabama (?) north to the Carolinas and Virginia.

Subnations: AL?, FL, GA, MS, NC, SC, VA?

TNC Ecoregions: 53:C, 55:P, 56:C, 57:C, 58:P

USFS Ecoregions: 232Bx:CCP, 232Bz:CC?, 232Cb:CCC, 232Ce:CCC, 232Ch:CCC, 232Dc:CPP, 232Eb:CPP

Federal Lands: USFS (Croatan, Francis Marion); USFWS (Alligator River)

ELEMENT SOURCES

References: Peet et al. unpubl. data 2002, Schafale and Weakley 1990, Southeastern Ecology Working Group n.d., Wharton 1978

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