Classification of Vegetation Communities of New Jersey: Second Iteration

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A Subset of the International Classification of Ecological Communities: Terrestrial Vegetation of the United States

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Preface

This classification of vegetation communities was developed as part of the Natural Heritage Program's mission to inventory New Jersey's biological diversity and identify habitats critical for conservation. New Jersey's biological diversity consists of thousands of species of organisms ranging from vertebrate animals to vascular plants to invertebrates to soil and water microorganisms. These species live together in natural communities, interacting with each other under similar environmental conditions. The biological inventory of the Natural Heritage Program and it's partner the Endangered and Nongame Species Program only has the capacity to focus on a limited portion of the species groups—vertebrate animals, vascular plants, select groups of invertebrates and nonvascular plants. Many more species groups are not surveyed. In addition to the species surveys, natural communities are classified and included in the inventory for two reasons: natural communities can act as a coarse filter to capture habitat for unsurveyed species groups; natural communities themselves represent a higher order of biological diversity above the species level.

This work builds on the *Preliminary Natural Community Classification for New Jersey* (Breden 1989). Breden's classification was developed in consultation with ecologists of Natural Heritage Programs in neighboring states and with regional ecologists from The Nature Conservancy in the Northeast. That work identified 54 natural communities in New Jersey—51 of which are vegetation communities. Unvegetated communities of lacustrine, riverine, and marine systems were largely not covered. Although there was general agreement on classification types with adjacent states, the approach taken by New Jersey and others fell short of producing a truly standard classification for the nation and the continent.

In the early 1990's The Nature Conservancy and the Association for Biodiversity Information began an initiative to develop a standard vegetation classification for the United States (Grossman *et al*. 1994; Sneddon *et al*. 1994). The resultant National Vegetation Classification (NVC) (Grossman 1998) was endorsed by the U.S. Federal Geographic Data Committee (FGDC 1997) as the standard vegetation classification system for use by Federal government agencies and their cooperators. Following the FGDC's endorsement of the NVC, a number of federal agencies such as the U.S. Geological Survey, the National Park Service and the U.S. Fish and Wildlife Service have incorporated the NVC into their work. The NVC also serves as a standard classification hierarchy for each state to adopt. The New Jersey Natural Heritage Program has worked in partnership with TNC and ABI to crosswalk the NVC to the 1989 classification and to recent New Jersey fieldwork. The result is presented here in this classification. The NVC is a much finer scale classification with 95 alliances and 138 associations identified for New Jersey to date compared with 51 vegetated communities described in the 1989 New Jersey Classification (Breden 1989). Having New Jersey's vegetation classification follow this new standard hierarchy facilitates comparison of the conservation status of communities among states. The standard classification also allows us to contribute to or learn from research on community types that range beyond New Jersey.

The approach taken to prepare this New Jersey classification has been to use descriptions of vegetation alliances and associations and other related information of the *International Classification of Ecological Communities: Terrestrial Vegetation* (ICEC) as it appears in a central database maintained by the Association for Biodiversity (ABI 2001). A fully searchable and periodically updated online source for ABI's ICEC is at www.nature.org. We used a July 3, 2001 download of the database. The database includes information contributed by the New Jersey Natural Heritage Program as well as information developed by other state natural heritage programs and staff of ABI and TNC. Introductory text describing the classification background, hierarchy, applications, nomenclature and database fields was modified from Weakley *et al*.

(1998) and Weakley *et al*. (1997). New Jersey specific information on abundance, patch size and rarity rank were imported from the New Jersey Natural Heritage Database.

It is anticipated that the New Jersey classification will be updated several times over the next decade. Each subsequent iteration of the classification will more completely describe the diversity of vegetated communities in the state. Several recent community classification studies by the New Jersey Natural Heritage Program have not yet been incorporated into the classification. These studies include descriptions of community types within and surrounding calcareous sinkhole ponds, pine barren riverside savannas, coastal plain intermittent ponds, floodplain forests, traprock glades and a variety of other vegetation types. Future iterations of the classification will include these community types after they have been captured in ABI's central database.

This classification was written for persons working in natural resource conservation, environmental protection and field biology dealing with issues of vegetation classification, vegetation mapping, and conservation of biological diversity. It is hoped that vegetation ecologists will be inspired to make further contributions to the refinement of the classification. In general we assume the reader is comfortable with the use of scientific botanical nomenclature. There are a number of plant identification manuals that can be consulted to familiarize oneself with the flora including *Newcomb's Wildflower Guide* (Newcomb 1977), *A Field Guide to the Trees and Shrubs* (Petrides 1972), the *Manual of Vascular Plants of Northeastern United States and Adjacent Canada* (Gleason and Cronquist 1991), the Illustrated Companion to Gleason and Cronquist's Manual (Holmgren 1998) and *Gray's Manual of Botany* (Fernald 1950). Some readers may also wish to consult references on vegetation ecology in order to supplement the information provided in this report. An excellent reference is *Plant Communities of New Jersey* (Collins and Anderson 1994).

Acknowledgments

The authors of this report were responsible for crosswalking the new National Vegetation Classification standard to the 1989 New Jersey classification (Breden 1989) and to other community types described in recent studies. A number of people helped with various aspects of the development and crosswalk of the New Jersey Classification and the preparation of this report. Their assistance is gratefully acknowledged. Lesley Sneddon, Julie Lundgren, and Mark Anderson all provided assistance and a regional perspective in crosswalking New Jersey's vegetation to the National Classification. They also were responsible for updating ABI's central databases with the New Jersey crosswalk. Tara Bowers assisted with collection, classification and computer entry of field data on vegetated communities. David Snyder provided much insight on the diversity and distribution of community types within the state. Many of the rare communities were first brought to the authors' attention by David. Elena Williams assisted with the installation and management of database software, the export of New Jersey data for incorporation in the report, and preparation of the map of physiographic provinces. Amy Breden assisted with editing of the bibliography. Funds for producing this New Jersey version of the classification were provided by the U.S. Biological Service Mid-Atlantic Gap Analysis Project and the New Jersey Dept. of Environmental Protection, Division of Science Research and Technology.

As stated in the preface, major portions of this report are adapted from other sources. Introductory text describing the classification background, hierarchy, applications, nomenclature and database fields was modified from Weakley *et al.* (1998) and Weakley *et al.* (1997). With the exception of the New Jersey-specific information on abundance, patch size and state rarity rank, all of the text for the alliance and association descriptions was taken from The Natural Heritage Central Databases of the Association for Biodiversity Information, July 2001. The vegetation alliances and associations presented here are the New Jersey portion of a more comprehensive classification of the terrestrial vegetation of the United States developed by the Association for Biodiversity Information in conjunction with its member programs.

The Association for Biodiversity Information is an international organization whose membership includes Natural Heritage Programs and Conservation Data Centres (CDC) in the U.S., Canada, Latin America and the Caribbean.

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Cover photos, top to bottom, left to right:

Chamaedaphne calyculata—(Gaylussacia dumosa)—Decodon verticillatus/Woodwardia virginica Dwarf-shrubland—Color slide by Tom Breden
Quercus (alba, rubra, velutina)/Cornus florida—Viburnum acerifolium Forest—Color photo by Kathleen Strakosch Walz
Pinus rigida—Quercus marilandica/Corema conradii Shrubland—Color slide by Tom Breden
Peltandra virginica—Pontederia cordata Tidal Herbaceous Vegetation—Color slide by Cynthia Coritz
Cakile edentula ssp. Edentula—Salsola caroliniana Sparse Vegetation—Color slide by Tom Breden
Pinus rigida/Gaylussacia dumosa/Calamovilfa brevipilis Woodland—Color slide by Andy Windisch

Background photo:

Ammophila breviligulata—Lathyrus japonicus Herbaceous Vegetation—Color slide by Tom Breden

Introduction

Background of the National Vegetation Classification

The purpose of the 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 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 classification will be consistent throughout the United States and elsewhere at appropriate scales for conservation planning, the management and long-term monitoring of ecological communities and ecosystems, and will have applications as a vegetation data layer in landscape and ecosystem characterization.

The national classification includes all existing vegetation, whether natural or cultural, but the New Jersey Natural Heritage Program has emphasized vegetation types that are "natural" since they are the focus of biodiversity protection. Therefore in this report we have only classified natural vegetation. All natural vegetation types occur spontaneously without regular human management, maintenance, or planting, and generally have a strong component of native species.

The National Vegetation Classification (NVC) is a combination of physiognomic and floristic systems. It 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 as defined here includes those portions of the palustrine, lacustrine, riverine, estuarine, and marine systems that have rooted vegetation. Classification of this vegetation (*i.e.* 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 rationale for coupling physiognomic and floristic systems has developed over many years (e.g., Rübel 1930, Whittaker 1962, Ellenberg 1963, Webb *et al*. 1970, Westhoff 1967, Beard 1973, Werger and Spangers 1982, Borhidi 1991). These studies have found a good correlation between floristic and physiognomic classifications of the same vegetation. In the United States, Driscoll *et al*. (1984) recommended the development of a joint system using the physiognomic units of UNESCO (1973) and the floristic units of habitat types, of which an example has been provided by Dick-Peddie (1993) for New Mexico. 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.

The combined physiognomic/floristic system used here 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 to 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 Vegetation Classification System (The Hierarchy)

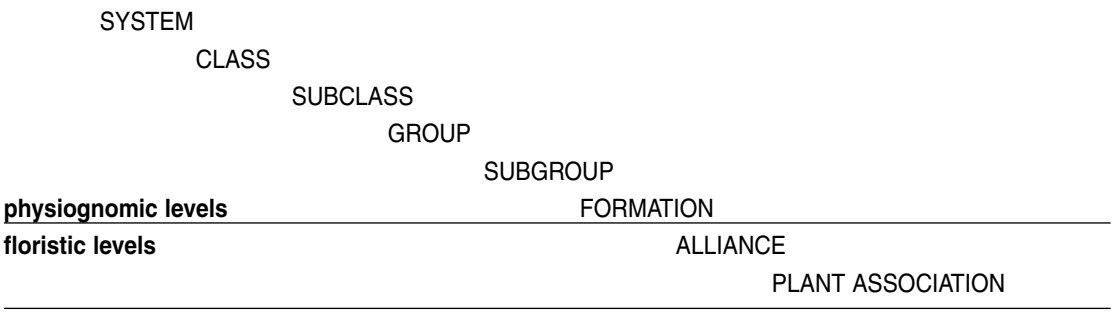
System Level

The top division of the classification hierarchy separates vegetated communities (Terrestrial System) from those of unvegetated deepwater habitats (Aquatic System) and unvegetated subterranean habitats (Subterranean System). The Terrestrial System of the national hierarchy is broadly defined and includes vegetation of uplands as well as emergent and rooted submerged vegetation of lakes, ponds, rivers, and marine shorelines. It includes, then, the portions of the Cowardin *et al.* (1979) palustrine, lacustrine, riverine, estuarine, and marine systems that have rooted vegetation. Communities of the Aquatic System lack rooted vegetation and are generally dominated by fish or invertebrates or floating vegetation. The Aquatic System includes non-vegetated (faunal) and vegetated communities and the Cowardin *et al.* (1979) marine, estuarine, riverine, and lacustrine systems beyond the limits of rooted vegetation. The Subterranean System includes terrestrial cave communities that are generally dominated by fauna.

There are different hierarchical divisions below each of the three Systems. The hierarchy for the Terrestrial System is now complete (Grossman *et al.* 1998). It has seven levels: the five highest levels are physiognomic (physiognomic class, physiognomic subclass, formation group, formation subgroup, and formation) and the two lowest levels are floristic (alliance and community association). The hierarchical levels of the Aquatic and Subterranean Systems are in development.

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 community, 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., lowland temperate seasonal evergreen forest, cold-deciduous woodland, short sod temperate or subpolar grassland). The levels of the classification system below the System level are listed in Figure 1 below, and described in the following sections (see also Table 1).

FIGURE 1. VEGETATION CLASSIFICATION SYSTEM



PHYSIOGNOMIC LEVELS: Descriptions and Definitions

The physiognomic portion of this classification hierarchy is a modification of the UNESCO world physiognomic classification of vegetation (1973) and incorporates some of the revisions made by Driscoll *et al*. (1984) for the United States.

The UNESCO vegetation classification system used physiognomy (outward appearance) and structure of the vegetation to define the units. It was intended to provide a comprehensive framework for the preparation of vegetation maps at a scale of 1:1,000,000 or smaller. The system was designed to include all natural and semi-natural vegetation, and excluded modified or "cultural" vegetation (wheat fields, vineyards, etc.).

The UNESCO hierarchy is fairly complex, and little information is provided that explains the criteria used to define each of the four hierarchical levels. The same criteria are sometimes used at different levels to define the units. The NVC modified the UNESCO system to improve the consistency and clarity of the classification hierarchy while maintaining its ecological meaning, and to make it applicable for classification and mapping at scales of 1:24,000 or larger. To improve the classification of wetland formations, the NVC further modified the UNESCO system by including more explicit hydrologic modifiers at the formation level. The hydrologic modifiers introduced by Cowardin *et al*. (1979) were chosen since these have been used extensively to map wetlands across the United States. However, these also were modified before inclusion into the hierarchy. In addition, 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 standards of the Federal Geographic Data Committee (FGDC) for vegetation classification (FGDC 1997). Each of the physiognomic levels is described in more detail by Grossman *et al.* (1998).

Physiognomic Class

The physiognomic class is based on the structure of the vegetation. This is determined by the height and relative percentage of cover of the dominant life-forms: tree, shrub, dwarf-shrub, herbaceous and nonvascular. This level has seven mutually exclusive classes: forest, woodland, shrubland, dwarf-shrubland, herbaceous vegetation, nonvascular vegetation, and sparse vegetation.

Forest: Trees with their crowns overlapping (generally forming 60 percent to 100 percent cover).

Woodland: Open stands of trees with crowns not usually touching (generally forming 25 percent to 60 percent cover).

Shrubland: Shrubs generally greater than 0.5 meters tall with individuals or clumps overlapping to not touching (generally forming greater than 25 percent cover). Vegetation dominated by woody vines is generally treated in this class.

Dwarf-shrubland: Low-growing shrubs, usually less than 0.5 meter tall, with individuals or clumps overlapping to not touching (generally forming greater than 25 percent cover; with trees and tall shrubs generally forming less than 25 percent cover).

Herbaceous: Herbaceous plants dominant (generally forming at least 25 percent cover, with trees, shrubs, and dwarf-shrubs generally forming less than 25 percent cover).

Nonvascular: Nonvascular cover (bryophytes, non-crustose lichens, and algae) dominant (generally forming at least 25 percent cover).

Sparse Vegetation: Abiotic substrate features dominant. Vegetation is scattered to nearly absent and generally restricted to areas of concentrated resources (total vegetation typically forming less than 25 percent cover).

Physiognomic Subclass

The physiognomic subclass is determined by the predominant leaf phenology of classes defined by a tree, shrub or dwarf-shrub stratum (evergreen, deciduous, mixed evergreen-deciduous), the persistence and growth form of herbaceous and nonvascular vegetation, and particle size of the substrate for sparse vegetation (e.g., consolidated rocks, gravel/cobble, sand). Examples include: Mixed evergreen—deciduous forest, Evergreen shrubland, Evergreen dwarf-shrubland, Perennial graminoid vegetation.

Group

The group (or formation group) generally represents a grouping of vegetation units based on leaf characters, such as broad-leaf, needle-leaf, microphyllous, and xeromorphic. These units are identified and named with broadly defined macroclimatic types to provide a structural-geographic orientation, but the ecological climate terms do not define the groups *per se*. Examples include: Needle-leaved evergreen shrubland, Mixed needle-leaved evergreen—cold-deciduous forest, Needle-leaved or microphyllous evergreen dwarf-shrubland, Temperate or subpolar grassland.

Subgroup

The subgroup (or formation subgroup) represents a distinction between natural vegetation, including natural, semi-natural and some modified vegetation, and cultural vegetation (planted/cultivated). Each formation is divided into either a natural subformation group or a cultural subformation group. The classification presented here for New Jersey only includes natural subformations.

Formation

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. Structural factors such as crown shape and lifeform of the dominant lower stratum are used in addition to the physiognomic characters already specified at the higher levels. The hydrologic regime modifiers were adapted from Cowardin *et al.* (1979; see Appendix 2), and are somewhat more explicit in defining vegetation units. With or without an organized hierarchy as presented here, the formation is a widely used vegetation concept (Whittaker 1962, Schrader-Frechette and McCoy 1993). Examples include: Rounded-crowned temperate or subpolar needle-leaved evergreen woodland, Saturated mixed needle-leaved evergreen—cold-deciduous forest, Caespitose needle-leaved or microphyllous evergreen dwarf-shrubland, Medium-tall sod temperate or subpolar grassland, Sand flats sparse vegetation.

FLORISTIC LEVELS: Descriptions and Definitions

The Alliance Concept

The alliance is a physiognomically uniform group of plant associations (see 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). 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:

Tsuga canadensis—Betula alleghaniensis Forest Alliance;

Pinus rigida—Acer rubrum Saturated Forest Alliance;

Picea mariana Saturated Woodland Alliance;

Pinus rigida Shrubland Alliance

Hudsonia tomentosa Dwarf-shrubland Alliance;

Ammophila breviligulata Herbaceous Alliance;

Spartina patens—(Distichlis spicata) Tidal Herbaceous Alliance;

Peltandra virginica—Pontederia cordata Tidal Herbaceous Alliance; and

Cakile edentula Sparse Vegetation 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., *Tsuga canadensis—Betula alleghaniensis* Forest Alliance. For wetland alliances, the hydrologic regime that the alliance is found in is always provided for clarity, e.g., *Pinus rigida—Acer rubrum* Saturated 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., *Panicum hemitomon* Seasonally Flooded Temperate Herbaceous Alliance; *Vallisneria americana* Permanently Flooded Temperate Herbaceous Alliance; *Nymphaes odorata—Nuphar* spp. Permanently Flooded Temperate Herbaceous Alliance).

Association

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 concept of an association is also used in habitat type methodology developed by Daubenmire (1952), but in that system it is restricted to climax or late seral vegetation (Pfister and Arno 1980).

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. The New Jersey Natural Heritage Program 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 classification system 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., tidal marsh complex, wooded dune and swale complex).

A few examples include:

Tsuga canadensis—Betula alleghaniensis—Prunus serotina / Rhododendron maximum Forest;

Pinus rigida—Acer rubrum / Rhododendron viscosum Forest;

Pinus mariana / (Vaccinium corymbosum,Gaylussacia baccata)/ Sphagnum spp. Woodland;

Pinus rigida—Quercus marilandica / Corema conradii Shrubland;

Hudsonia tomentosa / Panicum amarum Dwarf-shrubland;

Ammophila breviligulata—Panicum amarum Herbaceous Vegetation;

Peltandra virginica—Pontederia cordata Tidal Herbaceous Vegetation; and

Cakile edentula ssp. *Edentula—Salsola caroliniana* Sparse Vegetation.

TABLE 1. ILLUSTRATION OF THE CLASSIFICATION SYSTEM HIERARCHY

CLASS	FOREST	SHRUBLAND	DWARF-SHRUBLAND
SUBCLASS	Mixed Evergreen-Deciduous Forest	Evergreen Shrubland	Evergreen Dwarf-shrubland
GROUP	Mixed Needle-leaved Evergreen—Cold-deciduous Forest	Needle-leaved Evergreen Shrubland	Needle-leaved or Microphyllous Evergreen Dwarf-shrubland
SUBGROUP	Natural/Semi-natural	Natural/Semi-natural	Natural/Semi-natural
FORMATION	Saturated Mixed Needle-leaved Evergreen—Cold-deciduous Forest	Needle-leaved Evergreen Shrubland	Caespitose Needle-leaved or Microphyllous Evergreen Dwarf-shrubland
ALLIANCE	*Pinus rigida—Acer rubrum* Saturated Forest Alliance	*Pinus rigida* Shrubland Alliance	*Hudsonia tomentosa* Dwarf-shrubland Alliance
ASSOCIATION	*Pinus rigida—Acer rubrum/ Rhododendron viscosum* Forest	*Pinus rigida—Quercus marilandica / Corema conradii* Shrubland	*Hudsonia tomentosa / Panicum amarum* Dwarf-shrubland

Application of the Classification's Alliance Level for Mapping

An alliance level classification will help guide vegetation mapping programs, since vegetation maps are a special application of a vegetation classification (Küchler and Zonneveld 1988). For many applications it is important that a vegetation classification that is based on the similarity of structural, floristic, and ecological characteristics of vegetation be developed first. The mapping products then depict the vegetation patterns determined through ground surveys. The vegetation units are used to label relatively homogeneous polygons or signatures of vegetation to make a map that portrays spatial relationships of vegetation across the landscape.

Alliances, which are often based on dominant species in the top or dominant strata of the vegetation, are particularly amenable to mapping, provided that the map is being produced at the scale of pattern of the alliances. The mapping units may not have a one-to-one relationship to the alliance units, since a map is at a fixed scale and the scale and pattern of alliances are variable. Depending on the map scale desired, vegetation often will form a number of mosaic patterns. A mapping convention can be adopted to attribute a map polygon with multiple alliances and, because the classification system is hierarchical, it is possible to produce map units at different levels of the classification hierarchy.

Application of the Classification System for Conservation

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 central and regional offices of The Association for Biodiversity Information. 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). This report provides global and state ranks.

Community types (and species) that are rare or imperiled globally (ranked G1, G2, G3) or at the state level (S1, S2, S3) are often regarded as the principal targets for conservation action. These represent portions of the world's or state's biological diversity that are most at risk of being lost. Special attention is generally given to communities and species of high imperilment, as opportunities for their conservation may be limited in space and time. Ranking imperilment at two levels allows for prioritization of conservation at two levels. The highest priority is to address communities that are at risk of being lost from the world (globally imperiled), and the next level of priority are those communities that are at risk of being lost from the state. This allows for focus on both the conservation of the world's biological diversity as well as the biological diversity of the state.

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, (ranked G4 and G5 or S4 and S5), can also be conservation priorities. Though the type itself may be common, large, high quality examples might be rare and the opportunity to conserve such an example may be very limited. Generally, the conservation of these more common 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 National Vegetation Classification 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 various ranks used for communities presented in this document are listed and briefly described below.

G1—Critically imperiled globally;
G2—Imperiled globally;
G3—Rare or uncommon globally;
G4—Widespread, abundant, and apparently secure globally;
G5—Demonstrably widespread, abundant, and secure globally;
G?—Unranked;

GH—Historic;
GX—Extinct

S1—Critically imperiled in the state;
S2—Imperiled in the state;
S3—Rare or uncommon in the state;
S4—Widespread, abundant, and apparently secure in the state;
S5—Demonstrably widespread, abundant, and secure in the state;
S?—Unranked in the state;
SH—Historic in the state;
SX—Extirpated from the state

Seventy percent (96 associations) of the vegetation associations in New Jersey are ranked as rare or imperiled in the state (S1, S2, S3). Thirty-two percent (44 associations) are ranked as rare or imperiled globally (G1, G2, G3). To some degree, this large percentage of rare vegetation types reflects an increased attention that the Natural Heritage Program has given to classifying and inventorying the rare types that are considered to be conservation priorities.

A significant portion of the vegetation associations have not yet been ranked globally (58 associations, 42%) or at the state level (30 associations, 22%). Many of those lacking state ranks will require more field data and analysis to determine their abundance within the state. Those lacking global ranks generally require more information on abundance and imperilment in each state throughout their ranges.

Format of this Document

This publication presents a subset of the current version of the International Classification of Ecological Communities. The format in which the classification is presented, and the current completeness of information in various database fields in the classification, requires some explanation.

General

The classification is presented in the order of the hierarchy. Only those hierarchy units currently documented in New Jersey are presented. The hierarchy is presented in full in Grossman *et al.* 1998. The complete hierarchy offers a broad perspective on the physiognomic/floristic structure of the classification. The hierarchical presentation of the alliances and associations generally places closely related vegetation types 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 mixed needle-leaved evergreen—cold-deciduous forests will be found together in the Mixed Evergreen—Deciduous Forest Subclass. Of course, such a linear ordering of types does not and cannot capture all relationships, and sometimes communities that are closely related floristically are separated widely by the physiognomic hierarchy. For instance, Mixed Needle-leaved Evergreen—Cold-deciduous Woodlands are grouped together in II.C, separate from the Mixed Needle-leaved Evergreen—Cold-deciduous Forests. Some examples of close relationships that are particularly prone to cut across the hierarchy are:

1. Forests (I) and Woodlands (II). The structure of the hierarchy between the Forest Class and the Woodland Class is relatively parallel, and in many cases forests and woodlands with similar composition may be found in both classes.
2. In the "woody classes," Forests (I), Woodlands (II), Shrublands (III), and Dwarf-shrublands (IV), there are often close relationships between "mixed evergreen—deciduous" (Subclass C) and both "evergreen" (Subclass A) and "deciduous" (Subclass B).
3. Woodlands (II) and Shrublands (III) with particularly open woody structure are often closely related to herbaceous types (V).
4. Sparsely Vegetated (VII) and Herbaceous (V) are often closely related.

ALLIANCE AND ASSOCIATION NOMENCLATURE AND DESCRIPTIONS

Nomenclature

Alliances are named for constant dominants or codominants in the uppermost canopy layer. When a group concept contains two layers of vegetation (e.g. Tall temperate grassland with sparse broad-leaved evergreen shrubs), the alliance is named after species in the dominant stratum, while the association name includes species from the dominant and upper-most strata.

Associations are named with species from the alliance name, and have additional species that represent dominants or indicators from any layer of the vegetation. 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. Descriptive terms 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 species alone.

Parentheses around one or more species in a name indicate that the species may or may not occur within the alliance or association and may or may not be present in combination with the other species within the parentheses. For instance, the *Quercus alba—(Quercus rubra, Carya spp.)* Forest Alliance includes forests dominated by a mixture of *Quercus alba* (approximately 25–75 percent and always present) and either or both *Quercus rubra* and *Carya spp.* (approximately 25–75 percent in combination; see I.B.2.N.a.27).

Database Field Descriptions

The various components of text in the alliance and association descriptions have been downloaded from one of two databases. The majority of the text comes from fields in the central database of the Association for Biodiversity Information that houses the International Classification of Ecological Communities. State-specific text on NJ state rank, estimated number of occurrences, and state area comes from the New Jersey Natural Heritage Database. Some alliances or associations may not have all fields completed. Below are the fields portrayed in the classification report:

Global alliance code and *global scientific name.*

The alliance code represents its position in the hierarchy as a series of Roman numerals, letters, and Arabic numerals, with a terminal sequential number. The global scientific name is the name of the alliance or association using scientific botanical nomenclature.

Translated name:

This is the same as the global scientific name but with common names instead of scientific names for the species.

True Common Name:

Presented in italics and in brackets, this is a colloquial or commonly-used name for the association. These are still under development.

GRANK:

The global rank. Values are G1, G2, G3, G4, G5, GH, GX, G? as defined earlier in this report.

SRANK:

The state rank. Values are either S1, S2, S3, S4, S5, SH, SX, S?, as defined earlier in this report.

State Estimated EO's:

A= 1–5 occurrences; B= 6–20 occurrences; C= 21–100 occurrences; D= greater than 100 occurrences.

State Area:

Estimation of an association's total acreage within New Jersey. A= fewer than 100 acres; B= 100–1,000 acres; C= 1,000–10,000 acres; D= 10,000–100,000 acres; E = greater than 100,000 acres. This is followed by comments on the total acreage and range of patch sizes of the association in New Jersey.

Concept (or alliance/association description):

Description of the conceptual borders of the alliance/association 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.).

Comments:

This field contains miscellaneous additional comments, such as information about the range and variability of the type, local information which has not been globally reviewed, sources of information, problems to be resolved, etc.

Range:

This gives the states (United States and Mexico), provinces (Canada), and other countries in which the alliance is known or suspected to occur. A state, province, or country shown without a "?" indicates that the alliance/association is documented to occur there, or is very likely to occur there. A "?" indicates that the distribution is uncertain or speculative—the uncertainty often related to taxonomic questions about the circumscription of the alliance/association, but sometimes simply the result of lack of information. This listing is intended to be (and should be) comprehensive. Note that a state, province, or country may be listed for an alliance and not for any of its associations; this generally indicates that other associations remain to be described in the alliance.

Other States/Provinces:

A listing of the two-digit abbreviations of states in which the alliance or association occurs. For Associations, the state abbreviation is sometimes followed by a state rank (S1, S2, S3, S4, S5, S?, SH, SX) as it appears in the ABI central database.

Physiographic Province, Section and Subsection:

Distribution and confidence levels for USFS subsections (Keys *et al*. 1995) have been developed for alliances and associations. These are assigned a hierarchical code that references the Province and Section. The codes are listed for the full range of the alliance/association. A full listing of the codes for the U.S. can be found in Keys et al. (1995). The codes for provinces, sections and subsections that extend into New Jersey appear as bold text in the report. They are as follows:

221—Eastern Broadleaf Forest (Oceanic) Province

221A—Lower New England Section, 221Ae—NY/NJ Highlands Subsection, 221Am—Reading Prong Subsection;

221B—Hudson Valley Section, 221Ba Hudson-Kittatinny Valley Subsection, 221Bd—Kittatinny-Shawangunk Ridge and Valley Subsection;

221D Northern Appalachian Piedmont Section, 221Da—Gettysburg Piedmont Subsection, 221Dc—Newark Piedmont Subsection;

232—Outer Coastal Plain Mixed Forest Province

232A—Middle Atlantic Coastal Plain Section, 232Ab—Outer Coastal Plain Subsection, 232Ac—Inner Coastal Plain Subsection.

The locations of these subsections in New Jersey are illustrated in Figure 2. The subsection code is followed by a colon and up to three digits of confidence levels (e.g. 232Ac:CC?). The first three digits of the code refer to the physiographic province; the next capital letter refers to the section; the next lower case letter refers to the subsection. After the colon are values for confidence in the province, section, and subsection in that order. A value of C= confident or certain that it occurs in the province/section/or subsection; P= predicted or probable that it occurs in the province/section/subsection based on fact patterns (e.g. suitable habitat and present in adjacent section); ?= possible occurrence in the province/section/subsection. A listing of alliances and associations by section is found in Appendix 3.

Synonymy:

Synonymy is given for types that are understood to be equivalent, or partly so, to the given alliance. In particular, synonymy is provided to the Society of American Foresters (SAF) classification of forest cover types (Eyre 1980). Synonymy to state Natural Heritage Program classifications is given, but this synonymy is not fully populated. 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.

References:

These include published or unpublished sources which were either used to develop the type or which provide additional information concerning it. A full citation is available in the bibliography at the end of the report.

Authors:

Initials of responsible authors of the alliance/association concept are listed in parentheses following the alliance or association name. Some selected initials used (in alphabetic order): AA—Anne Andreu (formerly TNC), AJ—Ann Johnson (FLHP), ARS—Al Schotz (ALHP), ASW—Alan Weakley (ABI/TNC), CAS—Cindy Aulbach-Smith, CN—Carl Nordman (TNHP), DF-L—Don Faber-Langendoen (ABI/TNC), DJA—Dorothy Allard (formerly TNC), DT—Dave Taylor (USFS), ECS—Eastern Conservation Science (TNC-ERO), EGCP—East Gulf Coastal Plain Community Technical Team, GPF—Gary Fleming (VAHP), JA—Jonathan Ambrose (GAHP), JB—John Bozeman (GAHP), JC—Julian Campbell (TNC), JEM—Jackie Mohan (formerly TNC), JHM—Julie Moore (MSHP), JAT—Judy Teague, (ABI/TNC), JN—John Nelson (University of South Carolina), JRA—Jim Allison (GAHP), KP—Karen Patterson (ABI/TNC), KT—Keith Tassin (TNC), LAS—Lesley Sneddon (ABI/TNC), MCS—Midwestern Conservation Science (TNC-MRO), MJR—Mary Russo (ABI/TNC), MP—Milo Pyne (ABI/TNC), MPS—Mike Schafale (NCHP), RKP—Robert K. Peet (University of North Carolina at Chapel Hill), RW—Ron Wieland (MSHP), SL—Sally Landaal (TNC), WCS Western Conservation Science (TNC-WRO).

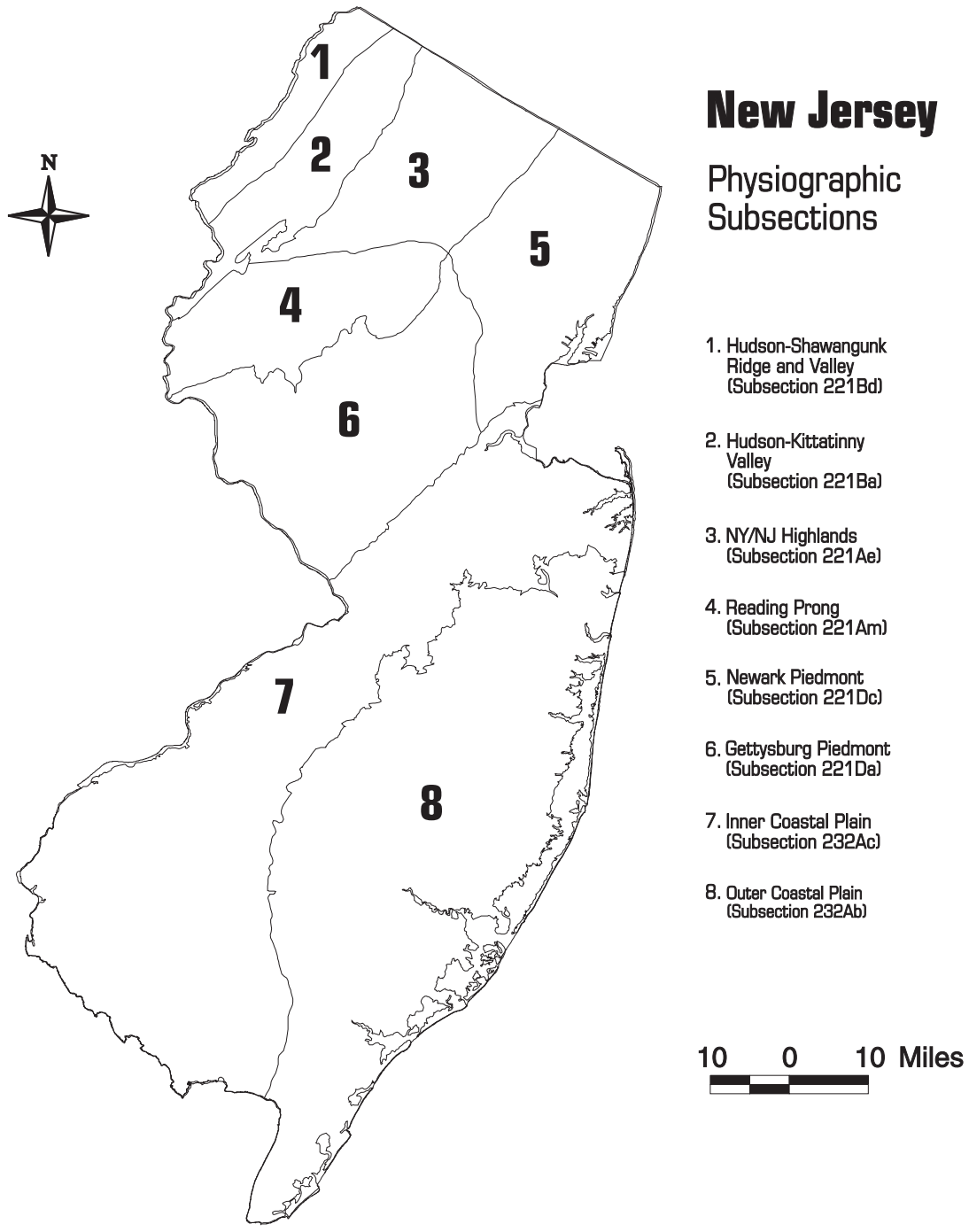
Confidence:

This code describes the degree of confidence associated with the classification of the Element. This is based on the quality and type of data used in its development, as well as the extent to which the entire (or potential) range of the Element was considered. Values are as follows: 1 = strong; 2 = moderate; 3 = weak. This latter category may be used for a new type for which data has only been collected at a very small number of sites.

Identifier:

For alliances, this is a sequential counter assigned by the database in which the data are maintained (e.g. A.57). For associations, this is a ten-digit alphanumeric code that identifies the association (e.g. CEGL006389).

FIGURE 2. PHYSIOGRAPHIC PROVINCE SUBSECTIONS



Map Source: New Jersey Forest Service 2001

I. Forest

I.A.4.N.a. Lowland temperate seasonal evergreen forest

I.A.4.N.a.300. ILEX OPACA FOREST ALLIANCE
American Holly Forest Alliance

Concept: Maritime evergreen forest dominated by *Ilex opaca*. Other canopy associates may include *Quercus* spp., *Juniperus virginiana, Sassafras albidum*. The canopy is flat-topped from wind-pruning.
Comments:
Range: This alliance is found in New York and New Jersey.
Other States/Provinces: NJ NY
Physiographic Province, Section, Subsection: 232Aa:CCC, **232Ab**:CCC
Synonymy:
References: Art 1987
Authors: L. SNEDDON, ECS **Identifier:** A.3002

ILEX OPACA / MORELLA PENSYLVANICA FOREST
American Holly / Northern Bayberry Forest
[Maritime Holly Forest]

G1 98-04-16
S1 01-08-15

State Estimated EO's: A—One occurrence at Sandy Hook.
State Area: A—Less than 100 acres in state. Patch size 5–40 acres.

Photos left to right, top to bottom:
Acer saccharum—Quercus muehlenbergii Forest—color photo by Kathleen Strakosch Walz
Tsuga canadensis—Betula alleghaniensis—Prunus serotina / Rhododendron maximum Forest—b&w photo by Robert Cartica
Quercus (alba, rubra, velutina) / Cornus florida—Viburnum acerifolium Forest—color photo by Kathleen Strakosch Walz
Pinus rigida—Acer rubrum / Rhododendron viscosum Forest—color slide by Tom Breden

Concept: Maritime holly forest of the lee sides of backdunes. The dominant tree is *Ilex opaca*. Other canopy associates include *Amelanchier canadensis, Sassafras albidum, Quercus stellata, Quercus velutina*. Characteristic shrubs include *Morella pensylvanica (= Myrica pensylvanica), Gaylussacia baccata, Vaccinium corymbosum*. Vines are particularly abundant, and include *Toxicodendron radicans, Smilax rotundifolia, Parthenocissus quinquefolia, Vitis* spp. The herbaceous layer is sparsely to moderately developed and includes *Aralia nudicaulis, Maianthemum stellatum (= Smilacina stellata), Maianthemum canadense*.
Comments:
Range:
Other States/Provinces: NY:S?
Physiographic Province, Section, Subsection: 232Aa:CCC, **232Ab**:CCC
Synonymy:
References: Art 1987, Chrysler 1930, Stalter 1979
Authors: ECS **Confidence:** 2 **Identifier:** CEGL006376

I.A.8.N.g. Saturated temperate or subpolar needle-leaved evergreen forest

I.A.8.N.g.2. CHAMAECYPARIS THYOIDES SATURATED FOREST ALLIANCE

Atlantic White-cedar Saturated Forest Alliance

Concept: These *Chamaecyparis thyoides*-dominated forests are found on saturated, peaty substrates. *Chamaecyparis thyoides* tolerates only brief inundation. The canopy of forests in this alliance may be heavily dominated by *Chamaecyparis thyoides*, or they may contain pines (*Pinus elliottii var. elliottii* in Florida basins, *Pinus serotina* in North Carolina peat domes) or hardwoods (for instance *Acer rubrum, Nyssa biflora*, and *Persea palustris*, or *Liriodendron tulipifera* in one rare example). The subcanopy may contain *Acer rubrum var. trilobum, Nyssa biflora, Magnolia virginiana, Nyssa biflora, Persea palustris*, and *Cliftonia monophylla*. *Sabal palmetto* and *Serenoa repens* are abundant on hummocks in one Florida association. The shrub stratum ranges from open to dense and may contain *Clethra alnifolia, Cyrilla racemiflora, Gaylussacia frondosa (= var. frondosa), Ilex coriacea, Ilex glabra, Lyonia lucida, Magnolia virginiana, Persea palustris, Smilax laurifolia*, and *Vaccinium formosum*. In some examples, the herbaceous stratum is well-developed and may contain *Orontium aquaticum, Mitchella repens, Drosera* sp., *Osmunda cinnamomea*, and *Osmunda regalis var. spectabilis*; in others it tends to be sparse and includes *Woodwardia areolata, Woodwardia virginica*, and *Osmunda cinnamomea*. *Sphagnum* spp., other mosses, and lichens may be common on exposed peat and rotting wood.

Examples of this alliance may be found along small blackwater or spring-fed streams not subject to much flooding or siltation (in Florida and the East Gulf Coastal Plain); along streams or at seepages (in the Fall-line Sandhills); or in Panhandle Florida in large, constantly saturated basins (inundated under several feet of water during the spring) where fire is an infrequent event; as well as peat dome forests of North Carolina and Virginia dominated by *Chamaecyparis* and *Pinus serotina*. Soils may be acidic peats but are usually circumneutral sands or sands overlain by peat. Soils are generally organic Histosols, composed of sand and peat, are permanently saturated, and include Histosols (Saprists and Hemists); the pH may be circumneutral or slightly acidic. Fires are infrequent and less destructive than in the northern range of *Chamaecyparis thyoides*.

Gap succession is more important in this community than post-fire regeneration and accounts for the mixed, uneven-aged stands. Lightning strikes are the main cause of mortality in mature white-cedar trees within the range of this association. Atlantic white-cedar communities are early successional but *Chamaecyparis thyoides* is a long-lived species (250+ years); gap regeneration is hypothesized to be the primary means of reproduction. The community often succeeds to itself following fire or other

disturbance. In the absence of fire and adequate gap regeneration, Atlantic White-cedar Forests may be replaced by Bay Forest. Known examples are generally neither flood-prone, nor exposed to frequent fire. One association is thought to become established following fire, with a return time of 25–100+ years.

Comments: Clewell and Ward (1987) describe a community along backswamps of larger rivers in Florida and along the Gulf Coast where "flooding is nominal." This could represent an additional association.

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

Other States/Provinces: AL CT DE? FL GA MA MD? ME MS NC NH NJ NY RI SC VA

Physiographic Province, Section, Subsection: 212Dc:PPP, 221Aa:CCP, 221Ab:CCC, 221Ac:CCC, 221Ad:CCC, **221Ae:**CCC, 221Af:CCC, 221Ag:CCC, 221Ah:CCC, 221Ai:CCC, 221Aj:CCP, 221Ak:CCC, 221Al:CCP, **221Am:**CCP, 221Bc:CCP, **221Bd:**CCP, **221Dc:**CCC, 232Aa:CCC, **232Ab**:CCC, **232Ac**:CCC, 232Ba:CCP, 232Bc:CCP, 232Bf:CCC, 232Bg:CCC, 232Bh:CCP, 232Bj:CCC, 232Bp:CCP, 232Bq:CCC, 232Br:CCC, 232Bt:CCC, 232Bu:CCP, 232Ca:CCC, 232Cb:CCC, 232Ch:CCC, 232Dc:CCC, 232Dd:CCP, M212Bb:C??

Synonymy: IIA2b. Atlantic White Cedar Swamp Forest, in part (Allard 1990); Atlantic White Cedar Swamp Forest (Oberholster 1993); Bottomland Forest, in part (Florida Natural Areas Inventory 1992a); White Cedar Swamp Forest (Wieland 1994b); Peatland Atlantic White Cedar Forest (Schafale and Weakley 1990); Streamhead Atlantic White Cedar Forest (Schafale and Weakley 1990); Atlantic White Cedar Swamp (Nelson 1986); Mesotrophic Saturated Forest, in part (Rawinski 1992); Atlantic White-Cedar: 97, in part (Eyre 1980)

References: Allard 1990, Clewell 1971, Clewell and Ward 1987, Eyre 1980, Fleming 1998, Florida Natural Areas Inventory 1992a, Florida Natural Areas Inventory 1992b, Frost 1987, Frost and Musselman 1987, Korstian and Brush 1931, Laderman 1989, Landaal 1978, Moore and Carter 1987, Nelson 1986, Oberholster 1993, Rawinski 1992, Schafale and Weakley 1990, Terwilliger 1987, Wharton 1978, Wharton et al. 1982, Whitehead 1972, Wieland 1994b, Wiseman 1986

Authors: D.J. ALLARD, MOD., JT, ECS **Identifier:** A.196

CHAMAECYPARIS THYOIDES / ILEX GLABRA FOREST
Atlantic White-cedar / Little Gallberry Forest
[Coastal Plain Atlantic White-cedar Swamp] **G3** 98-12-10
S3 01-08-15

State Estimated EO's: C
State Area: C—Patch size 1/2-20 acres; most frequent size 1/2–5 acres.

Concept: A conifer swamp that occurs on organic soils (usually peat) along streams and in poorly drained depressions of the Coastal Plain of New England, Long Island, New Jersey, and southward. The characteristic tree is Atlantic white-cedar, typically 15-20 m high. *Tsuga canadensis* and *Pinus rigida* are infrequent associates, with few hardwoods, primarily *Acer rubrum* and *Nyssa sylvatica*. Characteristic small trees and shrubs are *Clethra alnifolia, Ilex glabra, Morella pensylvanica (= Myrica pensylvanica), Gaylussacia frondosa (= var. frondosa), Leucothoe racemosa*, and *Vaccinium corymbosum*. Characteristic herbs, typically sparsely distributed or confined to sunny openings in the swamp, may include *Osmunda cinnamomea, Thelypteris palustris, Woodwardia* spp., *Gaultheria procumbens, Drosera intermedia, Sarracenia purpurea, Arethusa bulbosa, Pogonia ophioglossoides, Helonias bullata, Mitchella repens*, and sedges such as *Carex striata, Carex collinsii, Carex atlantica*. The ground cover is predominantly bryophytes, including several species of *Sphagnum*, commonly *Sphagnum fallax, Sphagnum flavicomans, Sphagnum magellanicum, Sphagnum pulchrum, Sphagnum recurvum*, and *Sphagnum palustre*.

Comments:
Range: This association occurs on the Atlantic and coastal plain from Massachusetts to New Jersey.
Other States/Provinces: CT?, MA:S?, MD?, NY:S?, RI:S?
Physiographic Province, Section, Subsection: 221Ab:CCC, 221Ac:CCC, 221Ad:CC?, **221B:**C?, 232Aa:CCC, 232Ab:CCC, **232Ac:**CCC
Synonymy:
References: Laderman 1989, McCormick 1979, Olsson 1979
Authors: ECS **Confidence:** 2 **Identifier:** CEGL006188

CHAMAECYPARIS THYOIDES / ILEX VERTICILLATA FOREST
Atlantic White-cedar / Winterberry Forest
[Inland Atlantic White-cedar Swamp] **G3** 98-12-10
S1 01-08-15

State Estimated EO's: A
State Area: A—1/4–<15 acre patches

Concept: An Atlantic white-cedar swamp that occurs on peat in poorly drained depressions of the coastal lowlands of New England, the Hudson Highlands of New York and northern New Jersey. It is characterized by many of the same species as the Coastal Plain counterpart, such as canopy associates *Acer rubrum, Nyssa sylvatica*, shrubs *Vaccinium corymbosum, Clethra alnifolia*, and herbs *Osmunda cinnamomea, Maianthemum canadense, Trientalis borealis, Gaultheria procumbens, Aralia nudicaulis*. The herbaceous layer is primarily *Sphagnum* mosses, including *Sphagnum fallax, Sphagnum flavicomans, Sphagnum magellanicum, Sphagnum pulchrum*, and *Sphagnum palustre*. Reschke (1990) notes the presence of the liverwort *Pallavicinia lyellii*. This type is differentiated from the Coastal Plain type by the presence or greater abundance of *Tsuga canadensis, Betula alleghaniensis, Ilex verticillata, Ilex laevigata, Nemopanthus mucronatus, Alnus incana, Carex trisperma*, and by the general absence of species with Coastal Plain affinities such as *Ilex glabra, Morella pensylvanica (= Myrica pensylvanica)*, and *Carex striata*.
Comments:
Range: This association is restricted to southern Maine and New Hampshire to northern New Jersey.
Other States/Provinces: CT:S?, MA:S?, ME:S?, NH:S?, NY:S?, RI:S?
Physiographic Province, Section, Subsection: 221Aa:CCP, **221Ae:**CCC, 221Af:CCC, 221Ag:CCC, 221Ai:CCP, 221Ak:CCC, 221Al:CCP, **221B:**CC, **221Dc:**CCC, M212:C
Synonymy:
References: Breden 1989, Enser 1993, Laderman 1989, McCormick 1979, Metzler 1997, Motzkin 1990, Reschke 1990, Sperduto and Ritter 1994
Authors: ECS **Confidence:** 2 **Identifier:** CEGL006189

CHAMAECYPARIS THYOIDES / RHODODENDRON MAXIMUM FOREST
Atlantic White-cedar / Great Rhododendron Forest
[Inland Atlantic White-cedar Swamp] **G?**
S1 01-08-15

State Estimated EO's: A—Less than 5 occurrences.
State Area: —Patch size small 1/4 acre to 10 acres.

Concept: Saturated peatland forest dominated by *Chamaecyparis thyoides* with a dense shrub layer dominated by *Rhododendron maximum*. Associated canopy trees may include *Acer rubrum, Betula alleghaniensis, Tsuga canadensis*, or *Nyssa sylvatica*. Associated shrubs are generally few and of low cover but may include *Kalmia latifolia, Vaccinium corymbosum,*

Rhododendron viscosum, Ilex verticillata, Nemopanthus mucronatus, and *Kalmia angustifolia*. The herbaceous layer is generally sparse due to the dense shade cast by shrubs, but may include *Trientalis borealis, Carex collinsii, Osmunda cinnamomea*. Typical *Sphagnum* mosses include *Sphagnum magellanicum, Sphagnum fallax, Sphagnum fimbriatum, Sphagnum russowii, Sphagnum recurvum* (Karlin 1988).This association occurs in southern New Hampshire, southern Rhode Island and Connecticut, southeastern New York and northern New Jersey.

Comments:

Range:

Other States/Provinces: CT:S?, NH:S?, NY:S?, RI:S?

Physiographic Province, Section, Subsection: 221Ad:CCC, **221Ae:**CCP, 221Ak:CCC, **221Dc:**CCC

Synonymy:

References: Breden 1989, Enser 1993, Karlin 1988, Metzler 1997, Reschke 1990, Sperduto and Ritter 1994

Authors: ECS **Confidence:** 2 **Identifier:** CEGL006355

I.A.8.N.g.300. PINUS TAEDA SATURATED FOREST ALLIANCE

Loblolly Pine Saturated Forest Alliance

Concept: Saturated forests dominated by *Pinus taeda* that may occur adjacent to salt marsh on the bay side of barrier islands. *Acer rubrum, Persea palustris*, and *Liquidambar styraciflua* also may be present in the canopy. The understory may have strong dominance by vine species including *Smilax rotundifolia, Toxicodendron radicans*, and *Parthenocissus quinquefolia*.

Comments: Assateague association may be better placed in a temporarily flooded formation (G. Fleming pers. comm.).

Range: This alliance is found in North Carolina, Delaware, Maryland, and Virginia, and possibly elsewhere. Occurs on the Northwest and North Landing rivers in North Carolina.

Other States/Provinces: DE MD NC NJ VA

Physiographic Province, Section, Subsection: 232Ab:CCP, 232Bz:CCC, 232C:CC

Synonymy: Estuarine Fringe Loblolly Pine Forest (Schafale and Weakley 1990); pine woodland, in part (Higgins et al. 1971); woodland community, in part (Hill 1986); mature loblolly pine stands of wet sites, in part (Bratton and Davison 1987); loblolly pine association, in part (Brush et al. 1980); coniferous swamp (Shreve et al. 1910); Loblolly Pine: 81, in part (Eyre 1980)

References: Bratton and Davison 1987, Brush et al. 1980, Eyre 1980, G. Fleming pers. comm., Higgins et al. 1971, Hill 1986, Schafale and Weakley 1990, Shreve et al. 1910

Authors: L. SNEDDON, MP, ECS **Identifier:** A.3009

PINUS TAEDA / MORELLA CERIFERA / OSMUNDA REGALIS VAR. SPECTABILIS FOREST

Loblolly Pine / Wax-myrtle / Royal Fern Forest

[Coastal Loblolly Pine Wetland Forest] **G2G3** 98-12-07

S1? 01-08-15

State Estimated EO's:—Not certain that this occurs in New Jersey.

State Area: —<1-acre patches.

Concept: This coastal wetland forest community is characterized by a closed to partially open canopy dominated by *Pinus taeda*. Other canopy associates may be absent, or may include *Acer rubrum, Persea palustris*, or *Liquidambar styraciflua*. The understory is made up of vines, strongly dominated by *Smilax rotundifolia*, with lesser amounts of *Toxicodendron radicans* and *Parthenocissus quinquefolia*. In addition to comprising the

majority of the ground layer of these forests, these vines are relatively large-stemmed lianas that contribute significant cover to the canopy by covering the lower branches of trees. *Morella cerifera (= Myrica cerifera)* is a typical shrub of this community. Fire may once have been an important ecological force in this community. The herbaceous layer is usually relatively sparse, characterized most frequently by ferns such as *Woodwardia areolata*, *Osmunda regalis var. spectabilis*, or *Osmunda cinnamomea*, and farther south (in North Carolina) by *Chasmanthium laxum*. *Polygonum pensylvanicum* may also occur. On Assateague Island National Seashore, *Pinus taeda* dominates the canopy, with occasional *Acer rubrum*. *Smilax rotundifolia* is the strongly dominant vine of the understory, with lesser amounts of *Toxicodendron radicans* and *Parthenocissus quinquefolia*. *Morella cerifera* is also a minor component of this vegetation. Despite the shallow water table and presence of muck, there is little reflection of the influence of hydrology on the vegetation. Trees tend to occur on slightly elevated hummocks, with standing water evident in hollows. *Phragmites australis, Rubus argutus, Panicum virgatum*, and *Polygonum pensylvanicum* also occur within this community on Assateague Island National Seashore. Tree diameters range from 12–36 cm dbh. This community occurs primarily on the bay side of the island adjacent to salt marsh. This community ranges from the coast of Delaware to North Carolina. This community is a maritime/coastal loblolly pine wetland forest occurring in backdune depressions intersecting the water table. Soils are characterized by moderately shallow muck (15 cm) overlying organic matter-stained sands. This vegetation occurs adjacent to salt marshes, sometimes even forming small 'islands' within high salt marsh. This forest occurs on Assateague Island National Seashore almost exclusively in association with the upland *Pinus taeda / Morella cerifera / Vitis rotundifolia* Forest (CEGL006040) as a result of the relatively high water table and natural undulations on the dune surface. Where sand has accumulated to a depth of 0.5 m or more above the water table, leaf litter accumulates as undecomposed duff, but where the substrate intersects the water table, organic material accumulates as muck. ECS This maritime/coastal loblolly pine wetland forest occurs from the shores of Delaware Bay south to North Carolina. The vegetation occurs in backdune depressions intersecting the water table. Soils are characterized by moderately shallow muck (15 cm) overlying organic matter-stained sands. This vegetation occurs adjacent to salt marshes, sometimes even forming small 'islands' within high salt marsh. The closed to partially open canopy is dominated by *Pinus taeda*. Other canopy associates may be absent, or may include *Acer rubrum, Persea palustris*, or *Liquidambar styraciflua*. The understory is made up of vines, strongly dominated by *Smilax rotundifolia*, with lesser amounts of *Toxicodendron radicans* and *Parthenocissus quinquefolia*. In addition to comprising the majority of the ground layer of these forests, these vines are relatively large-stemmed lianas that contribute significant cover to the canopy by covering the lower branches of trees. *Morella cerifera* is a typical shrub of this community. The herbaceous layer is usually relatively sparse, characterized most frequently by ferns such as *Woodwardia areolata, Osmunda regalis var. spectabilis, Osmunda cinnamomea*, or by *Chasmanthium laxum*. *Polygonum pensylvanicum* may also occur.

Comments:

Range:

Other States/Provinces: DE:S?, MD:S?, NC:S?, VA:S?

Physiographic Province, Section, Subsection: 232Ab: CCP, 232Bz:CCC, 232C:CC

Synonymy: Pine woodland, in part (Higgins et al. 1971), woodland community, in part (Hill 1986), mature loblolly pine stands of wet sites, in part (Bratton and Davison 1987), loblolly pine association, in part (Brush et al. 1980), coniferous swamp (Shreve et al. 1910), Loblolly Pine: 81, in part (Eyre 1980)

References: Bratton and Davison 1987, Brush et al. 1980, Eyre 1980, Higgins et al. 1971, Hill 1986, Schafale and Weakley 1990, Shreve et al. 1910
Authors: ECS **Confidence:** 2 **Identifier:** CEGL006137

I.A.8.N.g.7. TSUGA CANADENSIS SATURATED FOREST ALLIANCE
Eastern Hemlock Saturated Forest Alliance

Concept: This alliance, found in the Great Lakes states and northeastern United States, is characterized by wetland forests strongly dominated by *Tsuga canadensis*. Canopy associates include *Chamaecyparis thyoides* (in the eastern portion of this alliance's range), *Acer rubrum, Acer saccharum, Nyssa sylvatica* (in the east), *Pinus strobus, Betula alleghaniensis*, and *Thuja occidentalis* (in the center and west). The forest floor generally receives little light due to the dense canopy and thus has poorly developed herb and shrub layers. Shrubs occur in low abundance and may include *Corylus cornuta* (in the west), *Vaccinium corymbosum, Lindera benzoin* (in the east and center), and *Ilex verticillata*. *Osmunda* spp. and *Viola* spp. are often found in these communities across their range while *Onoclea sensibilis* is common in the east and in the west *Maianthemum canadense, Cornus canadensis*, and *Coptis trifolia* can usually be found.

Soils of this alliance vary from saturated muck to imperfectly drained mineral soils and are often acidic. Communities in this alliance occur in upland valleys created by bedrock depressions, on lower slopes, or adjacent to streams and lakes. In most cases they are transitional between wetland and upland communities. Microtopography is sometimes characterized by mounds and depressions caused by uprooted trees.

Comments:
Range: This alliance is found in northern Wisconsin, Michigan, northern Ohio, Maine, New Hampshire, Vermont, New Jersey, Maryland, and New York. It is in Canada in Ontario and possibly Quebec.
Other States/Provinces: CT MA MD ME MI? NJ NY OH ON PA RI VT WI WV
Physiographic Province, Section, Subsection: 212Ea:CC?, 212Eb:CC?, 212Ec:CCP, 212Fa:CPP, 212Fb:CPP, 212Fc:CPP, 212Fd:CPP, 212Ga:CPP, 212Gb:CPP, 212Ha:CCC, 212Hb:CCP, 212Hh:CCP, 212Hl:CCP, 212Hm:CCP, 212Ho:CCP, 212Hr:CCP, 212Ht:CCP, 212Hu:CCP, 212Hv:CC?, 212Hw:CCP, 212Ia:C??, 212Ja:CPP, 212Jb:CPP, 212Jc:CPP, 212Je:CPP, 212Jf:CPP, 212Jl:CPP, 212Jm:CPP, 212Jn:CPP, 212Jo:CPP, 221Ac:CCP, 221Ad:CCP, **221Ae:**CCP, 221Af:CCP, 221Ag:CCP, 221Ah:CCP, 221Ai:CCP, 221Aj:CCP, 221Ak:CCP, 221Al:CCP, **221Ba:**CCP, 221Bb:CCP, 221Bc:CCP, **221Bd:**CCP, 221Ea:C??, 221Fa:CCC, 221Fb:CCC, 221I:CC, 222Ia:CCC, 222Ib:CC?, 222Ic:CC?, 222Id:CCP, 222Ie:CC?, 222Ja:CCC, M212Ad:CCC, M212Ae:CCP, M212Af:CC?, M212Ba:CCP, M212Bb:CCP, M212Cc:CCP, M212Cd:CCP, M212Da:CCC, M212Db:CCC, M212Dc:CCC, M212Dd:CCC, M212De:CCC, M212Ea:CCP, M212Eb:CCP, M212Fa:CCC, M212Fb:CCC, M221Aa:CCP, M221Ac:CCC, M221Ba:CCP, M221Bb:CCC, M221Bd:CCP, M221Be:CC?, M221Bf:CCC, M221Ca:C??, M221Cb:C??, M221Da:CCC, M221Db:CCP, M221Dc:CCP
Synonymy: "mixed hemlock—Atlantic white cedar—red maple—yellow birch type" (Motzkin 1991); Hemlock—Yellow Birch: 24, in part (Eyre 1980); Atlantic White-Cedar: 97, in part (Eyre 1980); Eastern Hemlock: 23, in part (Eyre 1980); *Tsuga / Maianthemum-Coptis* type. Wisconsin (Kotar et al. 1988)
References: Eyre 1980, Faber-Langendoen et al. 1996, Kotar et al. 1988, Motzkin 1991
Authors: MCS **Identifier:** A.201

TSUGA CANADENSIS—BETULA ALLEGHANIENSIS / ILEX VERTICILLATA / SPHAGNUM SPP. FOREST
Eastern Hemlock—Yellow Birch / Winterberry / Peatmoss species Forest
[Hemlock—hardwood Swamp] **G5**
S2 01-08-15

State Estimated EO's: B
State Area: B—1–50 acres patch size

Concept: 'Typical' hemlock swamp in all eastern ecoregions north of High Alleghenies (HAL); lacks *Rhododendron maximum*.
Comments:
Range:
Other States/Provinces: CT:S?, MA:S?, ME:S?, NY:S?, OH:S3, PA:S?, RI:S?, VT:S2
Physiographic Province, Section, Subsection: 212E:CC, 212F:C?, 212G:C?, **221A**:CC, **221B:**CC, 221I:CC, M212Ad:CCC, M212Ae:CCP, M212Af:CC?, M212Ba:CCP, M212C:CC, M212Da:CCC, M212Db:CCC, M212Dc:CCC, M212Dd:CCC, M212De:CCC, M212E:CC, M212Fa:CCC, M212Fb:CCC
Synonymy:
References:
Authors: ECS **Confidence:** 2 **Identifier:** CEGL006226

TSUGA CANADENSIS / RHODODENDRON MAXIMUM / SPHAGNUM SPP. FOREST
Eastern Hemlock / Great Rhododendron / Peatmoss species Forest
[Eastern Hemlock—Great Laurel Swamp] **G?**
S1S2 01-08-15

State Estimated EO's: B
State Area: A—Certainly less than 500 acres, likely less than 100 acres in state. Patch size probably from 1/4 to 10 acres.

Concept: Hemlock swamp of Central Appalachians (CAP); usually has a prominent shrub layer dominated by *Rhododendron maximum*. These are closed-canopy conifer forest dominated by *Tsuga canadensis* with associates of *Acer rubrum, Nyssa sylvatica, Pinus strobus, Betula alleghaniensis*. The well-developed shrub layer contains *Ilex verticillata, Rhododendron maximum, Rhododendron viscosum, Vaccinium corymbosum, Lyonia ligustrina*. The sparse herb layer includes *Carex folliculata, Carex trisperma, Osmunda* spp., *Viola* spp., *Onoclea sensibilis, Maianthemum canadense, Cornus canadensis, Coptis trifolia*. Sphagnum mosses. These communities occur on saturated acidic muck to imperfectly drained mineral soils in upland valleys, bedrock depressions, low slopes, and adjacent to streams and lakes. Mounds and depressions caused by uprooted trees are typical.
Comments:
Range:
Other States/Provinces: MD:S?, PA:S?, WV:S?
Physiographic Province, Section, Subsection: 221Ae:CCP, 221Bd:CCP, 221E:C?, 221F:CC, M221Ac:CCC, M221Bb:CCC, M221Bf:CCC, M221C:C?, M221Da:CCC
Synonymy:
References: Karlin 1988
Authors: ECS **Confidence:** 2 **Identifier:** CEGL006279

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

I.B.2.N.a.4. ACER SACCHARUM—BETULA ALLEGHANIENSIS—(FAGUS GRANDIFOLIA) FOREST ALLIANCE

Sugar Maple—Yellow Birch—(American Beech) Forest Alliance

Concept: This alliance, found in the north-central and northeastern United States and adjacent southern Canada, is composed of rich mesic forests. Stands in this forest alliance typically have a closed canopy. Most of the trees are deciduous but conifers are often scattered throughout the stands. *Acer saccharum* is dominant in the overstory and sapling layer. *Betula alleghaniensis, Fagus grandifolia* (in the eastern two-thirds of this alliance's range), and *Tilia americana* may be codominants. Other common trees include *Abies balsamea, Acer rubrum, Fraxinus americana, Ostrya virginiana, Picea glauca, Pinus strobus, Quercus rubra*, and *Tsuga canadensis*. *Picea rubens* can be found in high elevation stands in the East. The dense overstory inhibits the growth of an abundant shrub layer. *Acer pensylvanicum* (in the east), *Corylus cornuta, Hamamelis virginiana, Lonicera canadensis, Taxus canadensis*, and *Viburnum acerifolium* are typical shrubs. Many of the common herbaceous species are typical of sub-boreal communities. These include *Aralia nudicaulis, Chimaphila maculata, Clintonia borealis, Lycopodium* spp., *Maianthemum canadense, Osmorhiza claytonii, Oxalis montana, Pteridium aquilinum*, and *Streptopus lanceolatus var. longipes (= Streptopus roseus)*. Stands of this alliance are found on moderate to deep (60–>150 cm) sandy loam, clay loam, or loamy sand soils. The soils are typically slightly acidic to circumneutral, mesic to wet-mesic and nutrient-rich. Most stands develop on flat to moderate slopes over glacial till. A relatively thick layer of fallen leaves covers the forest floor. Sites that support this alliance are on flat to moderately sloping terrain on glacial features such as till or moraines or on calcareous rocks, sandstone, or shale outside the glaciated region.

Comments:

Range: This alliance is found in eastern Minnesota, northern and eastern Wisconsin, Michigan, West Virginia, Virginia, Pennsylvania, New York, Maryland, Connecticut, Massachusetts, New Hampshire, Vermont, and Maine. It also occurs in Canada in southern Ontario.

Other States/Provinces: CT MA MD ME MI MN NH NJ NY ON PA RI VA VT WI WV

Physiographic Province, Section, Subsection: 212Aa:CCC, 212Ab:CCC, 212Ba:CCC, 212Bb:CCC, 212Ca:CCC, 212Cb:CCC, 212Da:CCC, 212Db:CCP, 212Dc:CCC, 212Ea:CPP, 212Eb:CPP, 212Ec:CPP, 212Ed:CPP, 212Fa:CCP, 212Fb:CCP, 212Fc:CCP, 212Fd:CCP, 212Ga:CCP, 212Gb:CCP, 212Ha:CCC, 212Hb:CCC, 212Hd:CCC, 212He:CCC, 212Hi:CCP, 212Hj:CCC, 212Hk:CCP, 212Hl:CCC, 212Hm:CCC, 212Hn:CCP, 212Ho:CCP, 212Hp:CCC, 212Hq:CCP, 212Hr:CCP, 212Hs:CCC, 212Ht:CCC, 212Hu:CCP, 212Hv:CCC, 212Hw:CCC, 212Hx:CCC, 212Hy:CCC, 212Ib:CCC, 212Ja:CCC, 212Jb:CCC, 212Jc:CCC, 212Je:CCC, 212Jf:CCP, 212Jj:CCC, 212Jl:CCC, 212Jm:CCC, 212Jn:CCP, 212Jo:CCP, 212Jr:CCC, 212Js:CCC, 212Kb:CCC, 212La:CC?, 212Lb:CCC, 212Lc:CCP, 212Ld:CCP, 212Mb:C??, 212Na:CCC, 212Nb:CCC, 212Nc:CCC, 212Nd:CCC, 212Oa:CCC, **221Ae:**CCC, 221Af:CCC, 221Ag:CCC, 221Ah:CCC, 221Ai:CCC, 221Ak:CCC, 221Al:CCC, **221Ba:**CCC, 221Bb:CCC, 221Bc:CCC, **221Bd:**CC?, 221Ea:C??, 221Fa:C??, 222E:CC, 222Ia:CCP, 222Ib:CCP, 222Ic:CCP, 222Id:CCP, 222Ie:CCP, 222If:CCP, 222Ja:CCC, 222Kc:CCC, 222Ke:CCC, 222Kf:CCC, 222Kg:CCC, M212Aa:CCC, M212Ab:CCC, M212Ac:CCC, M212Ad:CCC, M212Ae:CCC, M212Af:CCC, M212Ag:CCC, M212Ba:CCC, M212Bb:CCC, M212Bc:CCC, M212Bd:CCC, M212Ca:CCC, M212Cb:CCC, M212Cc:CCC, M212Cd:CCC, M212Da:CCC, M212Db:CCC, M212Dc:CCC, M212Dd:CCC, M212De:CCC, M212Df:CCC, M212Ea:CCP, M212Eb:CCP, M212Fa:CCC, M212Fb:CCC, M221Aa:CCC, M221Ac:CCC, M221Ba:CCC, M221Bb:CCC, M221Bc:CCC, M221Bd:CCP, M221Be:CCP, M221Bf:CCC, M221Ca:CP?, M221Cb:CPP, M221Da:C??, M221Dc:C??

Synonymy: Maple—Birch (Hansen et al. 1973); *Acer—Viola—Osmorhiza* type (Coffman and Willis 1977); Northern Mesic Forest, in part (Curtis 1959); Sugar Maple—Beech—Yellow Birch: 25, in part (Eyre 1980)
References: Coffman and Willis 1977, Curtis 1959, Eyre 1980, Faber-Langendoen et al. 1996, Flaccus and Ohmann 1964, Hansen et al. 1973, Kotar and Burger 1989, Pregitzer and Barnes 1984, U.S. Forest Service (USFS) 1994
Authors: ECS/MCS, KP, ECS **Identifier:** A.216

ACER SACCHARUM—BETULA ALLEGHANIENSIS—FAGUS GRANDIFOLIA / VIBURNUM LANTANOIDES FOREST
Sugar Maple—Yellow Birch—American Beech / Hobblebush Forest
[Northern Hardwood Forest] **G3G5** 98-06-24
S1S3 01-08-15

State Estimated EO's: AC—Estimated between 5 and 50 occurrences.
State Area: U—Estimated 20–1000 acres in state. Patch size ranges from 1/2 to 30 acres.

Concept: This association, known commonly as 'northern hardwood forest,' is a widespread matrix forest in central New England, and at lower elevations in northern New England. This forest occurs most commonly on acid, moderate to well-drained tills at elevations generally below 2500 feet. The closed canopy is dominated by *Acer saccharum, Fagus grandifolia*, and *Betula alleghaniensis* with associated hardwood species including *Betula papyrifera* and *Fraxinus americana*. Conifers are usually present at low abundance. Characteristic species include *Pinus strobus, Tsuga canadensis*, and in the northern portion of the range, *Picea rubens*. Oaks are generally not present, although *Quercus rubra* and *Quercus alba* may be present in low numbers. Characteristic understory shrubs or subcanopy trees include *Viburnum lantanoides, Acer spicatum*, and *Acer pensylvanicum*. The patchy herbaceous layer is a mix of ferns, rhizomatous herbs and clubmosses. Characteristic species include *Dryopteris intermedia, Dryopteris campyloptera, Huperzia lucidula, Maianthemum canadense, Clintonia borealis, Oxalis montana (= Oxalis acetosella), Trientalis borealis, Oclemena acuminata (= Aster acuminatus), Uvularia sessilifolia*. Occasional species include *Aralia nudicaulis, Trillium erectum, Trillium undulatum, Streptopus lanceolatus (= Streptopus roseus), Cinna latifolia, Thelypteris noveboracensis, Solidago macrophylla*, and *Medeola virginiana*. The bryophyte layer is of variable cover and may include *Dicranum* spp. and *Leucobryum glaucum*. At higher elevations any of the understory herbs characteristic of montane spruce—fir forests may be present and abundant. Sugar maple leaf litter is high in nitrogen relative to lignin and thus decomposes rapidly increasing the nutrient pool in the soil organic layer. Structure and composition of the forest are maintained primarily by single small tree-fall gaps. Yellow birch is maintained in the system by mineral soils on 'tip up mounds.'
Comments:
Range:
Other States/Provinces: CT:S?, MA:S?, ME:S4, NH:S?, NY:S?, RI:S?, VT:S4
Physiographic Province, Section, Subsection: 212Aa:CCC, 212Ab:CCC, 212Ba:CCC, 212Bb:CCC, 212Ca:CCC, 212Cb:CCC, 212Da:CCC, 212Dc:CCC, 212Fb:C??, **221Ae:**CCC, 221Af:CCC, 221Ag:CCC, 221Ah:CCC, 221Ai:CCC, 221Ak:CCC, 221Al:CCC, **221Ba:**CCC, 221Bb:CCC, 221Bc:CCC, 222E:CC, 222Id:CC?, M212Aa:CCC, M212Ab:CCC, M212Ac:CCC, M212Ad:CCC, M212Ae:CCC, M212Af:CCC, M212Ag:CCC, M212Ba:CCC, M212Bb:CCC, M212Bc:CCC, M212Bd:CCC, M212Ca:CCC, M212Cb:CCC, M212Cc:CCC, M212Cd:CCC, M212Da:CCC, M212Db:CCC, M212Dc:CCC, M212Dd:CCC, M212De:CCC, M212Df:CCC, M212E:CC, M212Fa:CCC, M212Fb:CCC
Synonymy: Northern hardwood forest: boreal/montane type (NAP)

References: Adamus 1978, Baldwin 1977, Breden 1989, Campbell and Eastman 1978, Flaccus 1972, Gordon 1937b, Harshberger 1905, Kern 1985, Kuchler 1956, Kuchler 1964, Little 1974, Maine Natural Heritage Program (MENHP) 1991, McIntosh 1972, Metzler and Barrett 1996, Moore and Taylor 1927, Niering 1953, Ohmann and Buell 1968, Reschke 1990, Simko 1987, Sperduto 1996, Thompson 1996, Woods 1987

Authors: ECS **Confidence:** 2 **Identifier:** CEGL006252

I.B.2.N.a.5. ACER SACCHARUM—FRAXINUS AMERICANA—TILIA AMERICANA FOREST ALLIANCE

Sugar Maple—White Ash—American Basswood Forest Alliance

Concept: This alliance, found in the northeastern United States and southern Canada, is broadly defined and contains a number of communities generally known as 'rich forests,' 'mixed mesophytic forests,' and 'rich northern hardwood forests.' The tree canopy of these forests is variable, but *Acer saccharum, Fraxinus americana*, and *Tilia americana* are almost always present. Associated canopy trees include *Quercus rubra, Ostrya virginiana, Ulmus rubra, Acer rubrum, Betula alleghaniensis, Fagus grandifolia, Juglans nigra, Liriodendron tulipifera, Magnolia acuminata*, and *Prunus serotina var. serotina*. The shrub layer is variable in cover and includes *Cornus alternifolia, Hamamelis virginiana, Lonicera canadensis, Rhododendron periclymenoides (= Rhododendron nudiflorum), Staphylea trifolia*, and *Viburnum acerifolium*. The herbs include *Cardamine* (subgen. *Dentaria*) spp., *Hepatica nobilis var. obtusa, Hydrophyllum virginianum, Elymus hystrix, Osmorhiza* spp., *Trillium grandiflorum, Viola* spp., and others. Stands of this alliance occur on flat to rolling topography, and some stands may be on steep slopes. Soils are usually deep, moderately to well-drained sands, loams, silt loams, moderately acid to moderately alkaline, and of high fertility, often derived from calcareous parent materials. Soil moisture holding and cation exchange capabilities are high.

Comments: The nominal *Tilia* species is *Tilia americana var. americana*, which occurs north of the range of *Tilia americana var. heterophylla*. In the Ridge and Valley of Virginia, this alliance occurs on steep, calcareous, bouldery, slopes and may have floristic affinities with rich calcareous forests farther south.

Range: This alliance is found in lower Michigan, New York, Pennsylvania, Maine, Massachusetts, Rhode Island, Vermont, Connecticut, New Hampshire, Maryland, West Virginia, and Virginia; and in Ontario, Canada.

Other States/Provinces: CT KY MA MD ME MI NH NJ NY ON PA RI TN? VA VT WV

Physiographic Province, Section, Subsection: 212Aa:CPP, 212Ab:CPP, 212Ba:CCP, 212C:CP, 212Da:CCP, 212Db:CC?, 212Dc:CC?, 212Ea:CC?, 212Eb:CC?, 212Ec:CCP, 212Ed:CCP, 212Fa:CCP, 212Fb:CCP, 212Fc:CCP, 212Fd:CCP, 212Ga:CCP, 212Gb:CCP, 212Hl:CPP, 212Hn:CPP, 212Ho:CPP, 212Hx:CPP, 212Hy:CPP, 212Ja:CPP, 212Jb:CPP, 212Jc:CPP, 212Jl:CPP, 212Jn:CPP, 212Jo:CPP, 221Ad:CC?, **221Ae:**CCC, 221Af:CCC, 221Ag:CCC, 221Ah:CCP, 221Ai:CCP, 221Ak:CC?, 221Al:CCP, **221Am:**CC?, **221Ba:**CCP, 221Bb:CCP, 221Bc:CCP, **221Bd:**CCP, **221Da:**CCP, 221Db:CCP, **221Dc:**CCP, 221Ea:CCP, 221Eb:CCP, 221Fa:CCP, 221Ja:CCC, 222D:CC, 222E:C?, 222F:CC, 222Ia:CCP, 222Ib:CCP, 222Ic:CCP, 222Id:CCP, 222Ie:CCP, 222If:CCP, 222O:CC, 231Aa:CCC, 231Ae:CCC, 231Ak:CCC, 231Al:CCC, 231Ap:CCC, M212Aa:CCP, M212Ab:CCP, M212Ac:CCP, M212Ad:CCC, M212Ae:CCC, M212Af:CCC, M212Ba:CCC, M212Bb:CCP, M212Bc:CCP, M212Bd:CCP, M212Ca:CCC, M212Cb:CCP, M212Cc:CCP, M212Cd:CCC, M212Da:CCC, M212Db:CCP, M212Dc:CCC, M212Dd:CCP, M212De:CCC, M212Df:CCC, M212Ea:CCP, M212Eb:CCP, M212Fa:CPP, M212Fb:CPP, M221Aa:CCC, M221Ab:CCC, M221Ac:CCC, M221Ba:CCC, M221Bb:CCC, M221Bc:CCC, M221Bd:CCP, M221Be:CCP, M221Bf:CCP, M221Ca:CCP, M221Cb:CCP, M221Cc:CC?, M221Cd:CC?, M221Ce:CCC, M221Da:CCC, M221Db:CCP, M221Dc:CCP

Synonymy: Sugar Maple—Basswood Association (Brush et al. 1980); Sugar Maple—Basswood: 26, in part (Eyre 1980); *Fraxinus americana—Juglans cinerea / Hydrophyllum virginianum* (Rawinski et al. 1994)
References: Brush et al. 1980, Cleland et al. 1994, Eyre 1980, Faber-Langendoen et al. 1996, Fleming 1999, Host and Pregitzer 1991, Lincoln 1961, Rawinski et al. 1994
Authors: ECS/MCS, KP, ECS **Identifier:** A.217

ACER SACCHARUM—FRAXINUS AMERICANA—JUGLANS CINEREA / STAPHYLEA TRIFOLIA FOREST
Sugar Maple—White Ash—Butternut / Bladdernut Forest

G?
S2 01-08-15

State Estimated EO's: B
State Area: B—Patch size 1/2–10 acres.

Concept: This semi-rich to rich forest of southern New England to Virginia occurs on talus slopes or shallow rocky soils overlying calcareous or circumneutral bedrock. Canopy dominants are *Acer saccharum* with *Fraxinus americana*. Canopy associates are *Juglans cinerea, Quercus rubra, Tilia americana, Carya cordiformis, Ostrya virginiana, Quercus muehlenbergii*, and *Carpinus caroliniana*. *Betula alleghaniensis, Fagus grandifolia* and *Ulmus* spp. may also occur. The shrub layer is fairly open, characterized by *Staphylea trifolia, Corylus* spp. and *Hamamelis virginiana* and with *Kalmia latifolia, Rubus odoratus, Parthenocissus quinquefolia, Toxicodendron radicans, Vitis* spp. This community is characterized by a fairly diverse herbaceous flora. Typical herbs include *Actaea pachypoda, Allium tricoccum, Aralia nudicaulis, Aralia racemosa, Asplenium platyneuron, Asarum canadense, Eurybia divaricata (= Aster divaricatus), Circaea lutetiana ssp. canadensis (= Circaea quadrisulcata), Cystopteris fragilis, Cystopteris bulbifera, Dryopteris* spp., *Polystichum acrostichoides, Sanguinaria canadensis, Solidago flexicaulis, Trillium erectum, Woodsia obtusa*, and others. Characteristic graminoids include *Carex laxiflora, Carex sprengelii, Carex virescens, Elymus hystrix (= Hystrix patula)*, and *Piptatherum racemosum (= Oryzopsis racemosa)*. This association grades into open woodland [see related woodland types *Tilia americana—Fraxinus americana / Acer spicatum / Cystopteris fragilis* Woodland (CEGL006204) and *Tilia americana—Fraxinus americana—(Acer saccharum) / Geranium robertianum* Woodland (CEGL005058)] and bedrock upslope.
Comments:
Range:
Other States/Provinces: CT:S?, MD:S?, NH:S?, NY:S?, PA:S?, VA:S?, VT:S?
Physiographic Province, Section, Subsection: 212F:??, 212G:??, **221Ae:**CCC, 221Af:CCC, 221Ag:CCC, 221Ah:CCP, 221Ai:CCP, 221Al:CCP, **221Ba:**CPP, **221Dc:**CPP, M212Bb:PPP, M212Bc:PPP, M212Bd:PPP, M212Cb:PPP, M212Cc:PPP, M221A:??, M221B:??
Synonymy: *Tilia americana / Staphylea trifolia / Cystopteris bulbifera* Forest (type 1.2) (Fleming 1999), Sugar maple-white ash-basswood cove forest (CAP) (Fleming 1999)
References: Fleming 1999, Fleming et al. 2001, Lundgren 2000
Authors: ECS **Confidence:** 3 **Identifier:** CEGL006020

ACER SACCHARUM—FRAXINUS AMERICANA—TILIA AMERICANA—MAGNOLIA ACUMINATA / ACTAEA RACEMOSA FOREST
Sugar Maple—White Ash—American Basswood—Cucumber-tree / Black Cohosh Forest

G?
S? 01-08-15

State Estimated EO's: ?—Presence in New Jersey not certain.
State Area: U

Concept: This is a rich mesic, deciduous forest of the High Alleghenies, Western Allegheny Plateau, and Central Appalachians. Stands occur in coves, slope bases, lower slopes, and moderate slopes. Soils are typically deep, fertile, moderately to well-drained and are often derived from calcareous parent materials, with textures including sands, loams, and silt loams. The canopy is dominated by *Acer saccharum* with *Fraxinus americana* and *Tilia americana* being very characteristic. Associated canopy trees include *Quercus rubra, Ostrya virginiana, Ulmus rubra, Acer rubrum, Betula alleghaniensis, Betula lenta, Fagus grandifolia, Juglans nigra, Liriodendron tulipifera, Magnolia acuminata, Carya cordiformis*, and *Prunus serotina*. The shrub layer is of variable composition, characterized by *Cornus alternifolia, Hamamelis virginiana, Lindera benzoin, Asimina triloba, Lonicera canadensis, Rhododendron periclymenoides (= Rhododendron nudiflorum)*, and *Viburnum acerifolium*. The herb layer is diverse and made up of *Adiantum pedatum, Asarum canadense, Actaea racemosa (= Cimicifuga racemosa), Cardamine* spp. (= *Dentaria* spp.), *Hepatica nobilis var. obtusa (= Hepatica americana), Hydrophyllum virginianum, Elymus hystrix (= Hystrix patula), Osmorhiza* spp., *Trillium grandiflorum, Viola* spp., *Dryopteris marginalis, Botrychium virginianum, Anemone quinquefolia, Geranium maculatum, Caulophyllum thalictroides, Sanguinaria canadensis, Claytonia virginica, Allium tricoccum, Cardamine concatenata, Arisaema triphyllum*, and *Laportea canadensis*. Its range has been extended into the Cumberlands of eastern Kentucky.

Comments:

Range: This forest is found in the High Alleghenies, Western Allegheny Plateau, Central Appalachians, and Cumberlands from New York and New Jersey south to West Virginia, Virginia, and eastern Kentucky.

Other States/Provinces: KY:S?, MD:S?, NY:S?, PA:S?, VA:S?, WV:S?

Physiographic Province, Section, Subsection: 212F:CC, 212G:CC, **221D:**CC, 221E:CC, 221F:CC, 231A:CC, M221Aa:CCC, M221Ac:CCC, M221Ba:CCC, M221Bb:CCC, M221Bc:CCC, M221C:CC, M221Da:CCC

Synonymy: *Acer saccharum var. saccharum—Tilia americana / Laportea canadensis—Caulophyllum thalictroides—Trillium grandiflorum* Forest (type 1.3) (Fleming 1999), Sugar maple-white ash-basswood cove forest (matrix/large patch) (CAP) (Fleming 1999)

References: Anderson et al. 1998, Campbell 2001, Fleming 1999, Fleming et al. 2001, Lundgren 2000

Authors: ECS **Confidence:** 3 **Identifier:** CEGL006237

ACER SACCHARUM—FRAXINUS SPP.—TILIA AMERICANA / OSMORHIZA CLAYTONII—CAULOPHYLLUM THALICTROIDES FOREST

Sugar Maple—Ash species—American Basswood / Blank Sweet-cicely—Blue Cohosh Forest

[Sugar Maple—Ash—Basswood Rich Mesic Forest] **G?** 96-10-03

S2? 01-08-15

State Estimated EO's: BC—Not confirmed in New Jersey but may have 15–50 occurrences.

State Area: B—Less than 1000 acres in state. Patch size probably 1/2–25 acres.

Concept: This rich maple-ash-basswood forest association is found from the northeastern United States and Canada to the central Great Lakes area, south to the High Alleghanies of Virginia and West Virginia. Stands occur on nutrient-rich, mesic or, sometimes, wet-mesic situations on flat to rolling terrain. The surface soils are deep sand, loamy sand, or loam and underlain by sandy clay loam to clay loam. The sites are somewhat poorly drained to well-drained and can have a water table 0.4–2 m below the surface. This forest community has a well-developed tree canopy composed of deciduous species. Shrubs are scattered, but the herbaceous stratum is well-represented. *Acer saccharum, Fraxinus americana*, and *Tilia americana* are the dominant trees; *Ostrya virginiana* and *Quercus rubra* are very common. *Acer rubrum, Betula*

alleghaniensis, Fagus grandifolia, and *Ulmus rubra* are typical associates. Shrubs that may be found in this community include *Cornus alternifolia, Hamamelis virginiana*, and *Lonicera canadensis*. The ground flora, much of which is spring ephemerals, is diverse and contains species such as *Allium tricoccum, Arisaema triphyllum, Botrychium virginianum, Caulophyllum thalictroides, Dicentra* spp., *Osmorhiza claytonii, Uvularia perfoliata*, and *Viola* spp. 6/98 NAP Closed-canopy forests dominated by *Acer saccharum*. Characteristic associates include *Fagus grandifolia, Fraxinus americana, Tilia americana, Betula alleghaniensis, Prunus serotina*, and *Juglans cinerea*. Shrub layer of *Viburnum lantanoides (= Viburnum alnifolium), Acer spicatum*, and other is similar to maple—beech—birch forests. These forests are primarily differentiated by a abundant and diverse herbaceous layer consisting primarily of nutrient- and light-requiring species. Many of these flower and fruit early in the spring before the tree canopy has fully leafed-out. Characteristic species include *Adiantum pedatum, Cystopteris bulbifera, Deparia acrostichoides (= Athyrium thelypterioides), Dryopteris goldiana, Dryopteris filix-mas, Botrychium virginianum*, and *Phegopteris hexagonoptera (= Thelypteris hexagonoptera)*. Various sedges are present (particularly the Laxiflora group) such as *Carex laxiflora, Carex platyphylla, Carex plantaginea, Carex leptonervia, Carex hitchcockiana, Carex aestivalis, Carex davisii*, and others. Characteristic flowering herbs include *Dicentra cucullaria, Dicentra canadensis, Hepatica* spp., *Asarum canadense, Caulophyllum thalictroides, Viola canadensis, Viola rotundifolia, Actaea pachypoda, Osmorhiza claytonii, Panax quinquefolius, Sanguinaria canadensis*, and many others. Enriched cove and convex slopes within northern hardwood forests. Elevation of known examples ranges from 380–2700 feet. Ground cover is deciduous litter, predominantly of nitrogen-rich sugar maple leaves.

Comments:

Range: This rich forest association is found from the northeastern United States and Canada to the central Great Lakes area, ranging from Maine south to New Jersey and east to Michigan and Ontario, and south to the High Alleghanies of Virginia and West Virginia.

Other States/Provinces: CT:S?, MA:S?, MD?, ME:S?, MI:S3, NH:S?, NY:S?, ON:S?, PA?, RI:S?, VA:S?, VT:S3, WV:S?

Physiographic Province, Section, Subsection: 212B:CC, 212D:CC, 212E:C?, 212Fb:CPP, 212Hl:CPP, 212Hn:CPP, 212Ho:CPP, 212Hx:CPP, 212Hy:CPP, 212Ja:CPP, 212Jb:CPP, 212Jc:CPP, 212Jl:CPP, 212Jn:CPP, 212Jo:CPP, 221A:CC, **221B:**CC, 222Id:CCP, M212Ad:CCC, M212Ae:CCC, M212Af:CCC, M212Ba:CCC, M212Ca:CCC, M212Cd:CCC, M212Da:CCC, M212Db:CCP, M212Dc:CCC, M212Dd:CCP, M212De:CCC, M212Df:CCC, M212E:CC, M212Fa:CPP, M212Fb:CPP, M221:C

Synonymy: Rich northern hardwood forest (NAP), Sugar maple-white ash-basswood-bluebead cove forest (CAP)

References: Fleming et al. 2001

Authors: D. Faber-Langendoen, mod. L. Sneddon, ECS **Confidence:** 2

Identifier: CEGL005008

I.B.2.N.a.46. CARYA (GLABRA, OVATA)—FRAXINUS AMERICANA—QUERCUS (ALBA, RUBRA) FOREST ALLIANCE

(Pignut Hickory, Shagbark Hickory)—White Ash—
(White Oak, Northern Red Oak) Forest Alliance

Concept: Communities of this alliance include dry, relatively 'rich' forests dominated by *Quercus* species and include *Carya* species as a prominent (rarely codominant) feature. *Fraxinus americana*, although sometimes a sporadic member, is generally characteristic of these forests. Associated canopy species include *Quercus alba, Quercus velutina, Quercus rubra, Carya ovalis, Carya glabra*, as well as other oaks and hickories.

Communities of this alliance generally occur on dry upper slopes or ridgetops. Soils are usually rich, and may range from slightly acidic to circumneutral pH, on well-drained loams or sandy loams, predominantly on southern or eastern exposures. The shrub layer is usually interrupted to absent. When present, it includes *Viburnum rafinesquianum*, and occasional *Vaccinium* species. *Viburnum acerifolium* is characteristic of some communities of this alliance. Although ericaceous species may be present and occasionally locally abundant, they are not characteristic. The herbaceous layer is characterized by forbs and may be quite diverse. A characteristic sedge is *Carex pensylvanica*. Other forbs found in these communities include *Asplenium platyneuron, Schizachyrium scoparium, Hepatica nobilis var. obtusa (= Hepatica americana), Asclepias quadrifolia, Desmodium* spp., and *Arabis canadensis*. The relatively open canopy, sparse shrub layer, and dense herbaceous layer impart a park-like appearance to many of these forests. However, this vegetation is classified as forest rather than woodland because total canopy cover generally exceeds 60%, and few, if any, of the herbs may be thought of as truly shade-intolerant. Those herbs that require high light levels are generally confined to small openings. Portions of SAF type 52, White Oak—Black Oak—Northern Red Oak, are contained within this alliance. These forests are somewhat similar to Braun's (1950) 'oak-hickory forests' of the Midwest. They share many of the same canopy species, and in some cases, similar physiognomy. However, the Oak-Hickory Region of Braun supports forests that occur in close association and intergrade with prairies, and share many of the same species in the herb layer, particularly legumes. For example, *Asclepias verticillata, Lithospermum canescens, Tephrosia virginiana, Desmodium* spp., *Euphorbia corollata*, and *Liatris* spp. occur in many of the oak—hickory forests of the Ozark Plateau, and Braun (1950) suggests that they may be remnants of prairie openings invaded by forest. A few outliers of 'Oak—Hickory' forests do occur in the East, however, and these are placed within the *Quercus velutina—Quercus alba—(Quercus coccinea)* Forest Alliance (A.1911).

Comments: Portions of SAF type 52, White Oak—Black Oak—Northern Red Oak, are contained within this alliance. These forests are somewhat similar to Braun's (1950) 'oak-hickory forests' of the Midwest. They share many of the same canopy species and, in some cases, similar physiognomy. However, the Oak-Hickory Region of Braun supports forests that occur in close association and intergrade with prairies, and share many of the same species in the herb layer, particularly legumes. For example, *Asclepias verticillata, Lithospermum canescens, Tephrosia virginiana, Desmodium* spp., *Euphorbia corollata*, and *Liatris* spp. occur in many of the oak—hickory forests of the Ozark Plateau, and Braun (1950) suggests that they may be remnants of prairie openings invaded by forest.

Range: This alliance is found in New York, Pennsylvania (?), Maryland (?), New Jersey (?), Delaware (?), Vermont, Connecticut, Massachusetts, and New Hampshire.

Other States/Provinces: CT DE? MA MD ME NH NJ NY PA VA VT WV

Physiographic Province, Section, Subsection: 212Da:CPP, 212Ea:CC?, 212Eb:CC?, 212Ec:CCP, 212Ed:CCP, 212Fa:CPP, 212Fb:CPP, 212Fc:CPP, 212Ga:CPP, 212Gb:CP?, 221Aa:CC?, 221Ab:CCC, **221Ae:**CCP, 221Af:CCP, 221Ag:CCP, 221Ah:CCP, 221Ai:CCP, 221Aj:CCP, 221Ak:CCC, 221Al:CCP, **221Ba:**CCP, 221Bb:CCP, 221Bc:CC?, **221Da:**CC?, 221Ea:CPP, 221Eb:CPP, 221Fa:CP?, 221G:CP, 222Ia:CCP, 222Ib:CCP, 222Ic:CCP, 222Id:CCP, 222Ie:CCP, 222If:CCP, 222O:C?, 231Ae:PPP, 231Ak:PP?, 231Al:PPP, 231Am:PPP, 231Ap:PPP, M212Bb:C??, M212Cc:CPP, M212Cd:CPP, M212Db:CCP, M212Dc:CCC, M212De:CCC, M212Ea:CPP, M212Eb:CPP, M221Aa:PPP, M221Ab:PPP, M221Ba:PP?, M221Bb:PPP, M221Bc:PP?, M221Bd:PPP, M221Be:PPP, M221Bf:PPP, M221Ca:PPP, M221Cb:PPP, M221Da:PPP

Synonymy: White Oak—Black Oak—Northern Red Oak: 52, in part (Eyre 1980); "oak-hickory forests" (Braun 1950)

References: Braun 1950, Eyre 1980
Authors: ECS **Identifier:** A.258

CARYA (GLABRA, OVATA)—FRAXINUS AMERICANA—QUERCUS SPP. CENTRAL APPALACHIAN FOREST
(Pignut Hickory, Shagbark Hickory)—White Ash—Oak species Central Appalachian Forest

G?
S? 01-08-15

State Estimated EO's: —Not yet assessed in New Jersey.
State Area:

Concept: Dry rich oak forest of Piedmont, Central Appalachians (CAP), Western Allegheny Plateau (WAP).
Comments:
Range:
Other States/Provinces: DE?, MD:S?, NJ?, NY:S?, PA:S?, WV:S?
Physiographic Province, Section, Subsection: 221D:P?, 221E:PP, 221F:PP, 221G:PP, 231A:??, M221A:PP, M221B:PP, M221C:PP
Synonymy: Oak-hickory-*Fraxinus* dry-mesic, rich forests (CAP)
References:
Authors: ECS **Confidence:** 3 **Identifier:** CEGL006236

QUERCUS RUBRA—CARYA (GLABRA, OVATA) / OSTRYA VIRGINIANA / CAREX PENSYLVANICA FOREST
Northern Red Oak—(Pignut Hickory, Shagbark Hickory) / Eastern Hop-hornbeam / Pennsylvania Sedge Forest
[Oak—Hickory / Hop-hornbeam Forest]

G? 97-12-31
S2S3? 01-08-15

State Estimated EO's: C
State Area: C—Probably less than 10,000 acres in state. Patch sizes range 5-200 acres.

Concept: Dry rich forests of Lower New England (LNE) and extending discontinuously south to Virginia's southern Appalachian Mountains. Low-elevation ridgetops, upper slopes, south- or west-facing sideslopes dominated by oaks, hickories, and ash. Occurs only in extreme south or margins of the Champlain Valley. Characteristic spp.: *Viburnum acerifolium, Cornus florida, Desmodium paniculatum, Desmodium glutinosum, Hepatica nobilis var. obtusa (= Hepatica americana)*. This community is similar in many respects to Rich Red Oak—Sugar Maple / Ironwood Talus Forest but is characterized by certain Appalachian or southern species that reach their northern range edge in southern New Hampshire and that are absent from most rich talus slopes from south-central to northern New Hampshire. Southern oaks, hickories, flowering dogwood, and a number of herbaceous species distinguish the type, while a few northern species drop out. Most examples are relatively small due to the low relief of hills and small cliffs of southern New Hampshire (up to several acres and occasionally more). 6/98 NAP Closed canopy of *Quercus rubra, Quercus alba, Quercus velutina, Carya glabra, Carya ovata, Carya ovalis, Ostrya virginiana, Fraxinus americana, Acer rubrum. Acer saccharum, Pinus strobus*, and *Thuja occidentalis* are often present in small quantities. Subcanopy of *Hamamelis virginiana, Cornus florida, Amelanchier arborea*, and *Prunus virginiana*. Shrub layer of *Viburnum acerifolium, Vaccinium angustifolium, Vaccinium pallidum, Rubus idaeus, Corylus cornuta*. Diverse herb layer of *Aralia nudicaulis, Maianthemum racemosum (= Smilacina racemosa), Desmodium glutinosum, Desmodium paniculatum, Prenanthes alba, Solidago bicolor, Hepatica nobilis var. obtusa (= Hepatica americana)*. Low-elevation ridgetops, upper slopes, south- or west-facing sideslopes. Soils are well-drained loams or sandy loams, often derived from alkaline bedrock.

Comments:
Range:
Other States/Provinces: CT:S?, MA:S?, ME:S?, NH:S?, NY:S?, VA:S?, VT:S?
Physiographic Province, Section, Subsection: 212E:CC, 221Ab:CCC, 221Ak:CCC, **221B:**CC, **221D:**CC, 222I:CC, M212B:C?, M212C:C?, M212Dc:CCC, M212De:CCC
Synonymy:
References: Breden 1989, Fleming et al. 2001, Metzler and Barrett 1996, Reschke 1990, Sperduto 1997b
Authors: ECS **Confidence:** 2 **Identifier:** CEGL006301

I.B.2.N.a.17. FAGUS GRANDIFOLIA—QUERCUS RUBRA—QUERCUS ALBA FOREST ALLIANCE

American Beech—Northern Red Oak—White Oak Forest Alliance

Concept: Forests in this alliance occur in non-montane or low-elevation montane mesic situations and are dominated by *Fagus grandifolia* with or without some combination of the *Quercus* spp. Associated canopy and subcanopy species can include *Liriodendron tulipifera, Acer saccharum, Magnolia tripetala, Magnolia acuminata* (Ozarks), *Tilia americana var. americana* (Ozarks), *Tilia americana var. heterophylla, Quercus muehlenbergii, Acer rubrum, Cornus florida, Ostrya virginiana, Aesculus sylvatica*, and *Ilex opaca*. Some of these forests, particularly in the Piedmont of South Carolina, the southern Ridge and Valley of Alabama, or in Arkansas, may have *Acer barbatum*. Shrubs in this alliance include *Vaccinium stamineum, Viburnum rafinesquianum, Euonymus americana*, and, in some occurrences, *Kalmia latifolia*. The herb layer can be relatively lush with such species as *Polystichum acrostichoides, Galium circaezans, Hexastylis arifolia, Hexastylis minor, Desmodium nudiflorum, Erythronium umbilicatum ssp. umbilicatum, Hepatica nobilis var. obtusa, Epifagus virginiana, Tiarella cordifolia var. collina, Trillium* spp., *Heuchera americana, Stellaria pubera, Podophyllum peltatum, Botrychium virginianum*, and others present. These forests often occur on north-facing slopes, low slopes, high terraces along streams, and possibly other situations. Forests in this alliance occur in the Cumberlands and Southern Ridge and Valley, Piedmont and Interior Low Plateau, and on protected slopes and ravines in the Ozarks, central Ouachita Mountains, and Arkansas Valley.
Comments: The relationship between this alliance and I.B.2.N.a *Fagus grandifolia—Quercus alba* Forest Alliance (A.228) needs to be clarified. Vegetation from this alliance is known from Ozark and Ouachita national forests RNAs (Roaring Branch and Dismal Hollow) and occurs on the Shoal Creek District of the Talladega National Forest.
Range: Forests in this alliance occur in the Cumberlands and Southern Ridge and Valley, Piedmont, and Interior Low Plateau, and on protected slopes and ravines in the Ozarks, central Ouachita Mountains, and Arkansas Valley. This alliance is known from the states of Alabama, Arkansas, Delaware, Georgia, Massachusetts, Maryland, North Carolina, New Jersey, New York, Oklahoma, Pennsylvania, Rhode Island, Tennessee, and West Virginia. It may possibly occur in southern Indiana, Kentucky, Connecticut, and Virginia.
Other States/Provinces: AL AR CT? DE GA IN? KY MA MD NC NJ NY OK PA RI SC TN VA WV
Physiographic Province, Section, Subsection: 221Ab:CCC, 221Ac:CCC, 221Ad:CCC, **221Ae:**CCP, **221Dc:**CPP, 221Ea:CCC, 221Ha:CCC, 221Hc:CCP, 221Hd:CCP, 221He:CCC, 221Ja:CCP, 221Jb:CC?, 221Jc:CCP, 222Ab:CCC, 222Ag:CCC, 222An:CCC, 222Cb:CC?, 222Cc:CC?, 222Cd:CC?, 222Ce:CC?, 222Cf:CC?, 222Cg:CC?, 222Da:CCP, 222Db:CCP, 222Dc:CCP, 222Dd:CCP, 222De:CCP, 222Dg:CC?, 222Di:CC?, 222Dj:CC?, 222Ea:CCC, 222Eb:CCC, 222Ec:CC?, 222Ee:CCP, 222Ef:CCP, 222Eg:CCC, 222Eh:CCP, 222Ei:CCP, 222Ej:CCP, 222Ek:CCP, 222Em:CCP, 222En:CCP, 222Eo:CCP, 222F:CC, 231Aa:CCC, 231Ab:CCC, 231Ac:CCP, 231Ad:CCC, 231Ae:CCC, 231Af:CCC, 231Ag:CCC,

231Ah:CCC, 231Ai:CCC, 231Aj:CCC, 231Ak:CCP, 231Am:CCP, 231An:CCC, 231Ao:CCC, 231Ba:C??, 231Bb:C??, 231Be:C??, 231Bg:C??, 231Bh:C??, 231Bi:C??, 231Bk:C??, 231Ca:CCP, 231Cb:CCP, 231Cc:CCP, 231Cd:CCC, 231Ce:CCP, 231Cf:CCP, 231Cg:CCP, 231Da:CCC, 231Db:CCP, 231Dc:CCC, 231Dd:CCC, 231Gb:CCC, 232Aa:CCC, **232Ab:**CCC, **232Ac:**CCC, 232Ad:CCC, 232Br:CCC, 232Bt:CCC, 232Bx:CCP, 232Bz:CCC, 232C:CC, 234Ab:PPP, M221Dd:CCC, M222Aa:CCC, M222Ab:CCC, M231Aa:CCC, M231Ab:CCC, M231Ac:CCC

Synonymy: Typic Mesic Piedmont Forest, in part (Allard 1990); Mixed Mesophytic Forest, in part (Foti 1994b); Piedmont Mesic Broad-leaved Deciduous Forest (Ambrose 1990a); Mesic Mixed Hardwood Forest, Piedmont Subtype (Schafale and Weakley 1990); Appalachian mesophytic forest, in part (Evans 1991); Beech RV? (Pyne 1994); T1B4aI. *Fagus grandifolia* (Foti et al. 1994); TIB4aI1a. *Fagus grandifolia/Magnolia tripetala* (Foti et al. 1994); T1B4aI1b. *Fagus grandifolia—Acer saccharum—Quercus spp. (alba, muehlenbergii, rubra)* (Foti et al. 1994); Beech—Sugar Maple: 60, in part (Eyre 1980); Northern Red Oak: 55, in part (Eyre 1980)

References: Allard 1990, Ambrose 1990a, Evans 1991, Eyre 1980, Faber-Langendoen et al. 1996, Foti 1994b, Foti et al. 1994, Golden 1979, Jones 1988a, Jones 1988b, Martin and Smith 1991, Pyne 1994, Schafale and Weakley 1990, U.S. Forest Service (USFS) 1990

Authors: D.J. ALLARD, MOD. A.S. WE, KP, SCS **Identifier:** A.229

FAGUS GRANDIFOLIA—QUERCUS ALBA—LIRIODENDRON TULIPIFERA—CARYA SPP. FOREST
American Beech—White Oak—Tuliptree—Hickory species Forest

G?
S3 01-08-15

State Estimated EO's: C—Estimate between 20 to >100 occurrences.

State Area: D—1,000–10,000 acres estimated. Mostly scattered patches >100 acres, few patches may be 500–1,000 acres but are not documented.

Concept: This central Atlantic Coastal Plain forest of dry-mesic soils is characterized by a mixed canopy of *Quercus alba, Quercus falcata, Quercus phellos, Quercus coccinea, Fagus grandifolia, Carya glabra, Carya alba, Liriodendron tulipifera, Sassafras albidum*, and *Liquidambar styraciflua*. The subcanopy is characterized by *Ilex opaca*, with *Cornus florida* also typical in Maryland and Delaware. Vines are common, including *Parthenocissus quinquefolia, Smilax glauca* and *Toxicodendron radicans*. The shrub layer is characterized by *Viburnum acerifolium*; heaths, such as *Vaccinium* spp. and *Gaylussacia baccata*, may be present and sometimes locally dominant but not generally characteristic. The herb layer is comprised of *Podophyllum peltatum, Polystichum acrostichoides, Uvularia perfoliata, Parthenocissus quinquefolia, Cypripedium acaule, Mitchella repens, Tipularia discolor, Goodyera pubescens, Eurybia divaricata (= Aster divaricatus), Chimaphila maculata, Carex swanii*, and *Polygonatum biflorum*.

Comments:

Range:

Other States/Provinces: DE:S?, MD:S?, PA:S?, VA:S?

Physiographic Province, Section, Subsection: 232Ac:CCC, 232Ad:CCC, 232Br:CCC, 232Bt:CCC, 232Bx:CCP, 232Bz:CCC, 232C:C?

Synonymy: Mesic Coastal Plain mixed oak forest, mixed oak—beech forest subtype (Breden 1989), *Quercus spp.—Carya spp. / Cornus florida—Ilex opaca* Mesic Forest (Clancy 1993), Coastal Plain Forest, in part (Smith 1983), Mixed oak forest of the south Jersey mesic uplands (Robichaud and Buell 1973), *Fagus grandifolia—Liriodendron tulipifera / Asimina triloba / Botrychium virginianum* Forest (Robichaud and Buell 1973)

References: Bernard and Bernard 1971, Bowman n.d., Breden 1989, Clancy 1993, Davis et al. 1992, McCoy and Fleming 2000, Robichaud and Buell 1973, Smith 1983

Authors: ECS **Confidence:** 2 **Identifier:** CEGL006075

Fagus grandifolia—Quercus alba—Quercus rubra—Liriodendron tulipifera Forest
American Beech—White Oak—Northern Red Oak—Tuliptree Forest
[Coastal Oak—Beech—Tuliptree Forest] **G?**
S2 01-08-15

State Estimated EO's: BC—Between 10–50 occurrences likely.
State Area: U—Probably between 200–2,000 acres present in New Jersey. Patch sizes 1-50 acres.

Concept: This deciduous near-coastal forest of southern New England, New York, and the Inner Coastal Plain of New Jersey is characterized by a mixed canopy of *Fagus grandifolia, Quercus alba, Quercus rubra, Liriodendron tulipifera, Quercus coccinea* in varying percentages. Although not generally abundant, both *Acer saccharum* and *Betula papyrifera* are characteristic of this forest, the latter restricted to New York (Hunt 1997). *Cornus florida* is a characteristic understory species, and *Ilex opaca* is a frequent associate. The shrub layer is characterized most commonly by *Viburnum acerifolium*. The herb layer includes *Maianthemum racemosum (= Smilacina racemosa), Polygonatum biflorum, Arisaema triphyllum, Geranium maculatum, Parthenocissus quinquefolia, Carex swanii*. This community is closely related to Coastal Plain forests of this alliance in southern New Jersey and farther south, but is differentiated from them by the presence of *Quercus rubra, Betula papyrifera*, and *Acer saccharum*.
Comments:
Range:
Other States/Provinces: CT?, NY:S?
Physiographic Province, Section, Subsection: 221Ae:PPP, **221Dc:**PPP, 232Aa:CCC, **232Ab:**CCC, **232Ac:**CCC
Synonymy:
References: Breden 1989, Greller 1977, Greller et al. 1978, Hunt 1997
Authors: ECS **Confidence:** 2 **Identifier:** CEGL006377

Quercus velutina—Fagus grandifolia—Sassafras albidum / Ilex opaca Forest
Black Oak—American Beech—Sassafras / American Holly Forest
[Coastal Oak—Holly Forest] **G?**

State Estimated EO's:—Not yet determined in New Jersey.
State Area:

Concept: Northeastern coastal forest sheltered from direct maritime influences by its more inland position. Dominants are *Quercus velutina, Fagus grandifolia, Quercus alba, Quercus coccinea, Nyssa sylvatica*. Other associates include *Acer rubrum, Amelanchier canadensis, Sassafras albidum*. *Ilex opaca* is a characteristic understory species. The shrub layer is characterized by *Vaccinium corymbosum, Hamamelis virginiana, Viburnum recognitum, Kalmia latifolia*. Characteristic herbs include *Trientalis borealis, Carex swanii, Thelypteris noveboracensis, Maianthemum canadense, Uvularia* spp. Vines are common but not usually abundant, and include such species as *Toxicodendron radicans, Parthenocissus quinquefolia, Smilax rotundifolia, Smilax glauca, Vitis* spp.
Comments:
Range:
Other States/Provinces: MA:S?, NY:S?, RI:S?
Physiographic Province, Section, Subsection: 221Ac:CCC, 221Ad:CCC, 232Aa:CCC, **232Ab:**CCP
Synonymy:
References: Breden 1989, Hunt 1997
Authors: ECS **Confidence:** 2 **Identifier:** CEGL006378

I.B.2.N.a.27. QUERCUS ALBA—(QUERCUS RUBRA, CARYA SPP.) FOREST ALLIANCE

White Oak—(Northern Red Oak, Hickory species) Forest Alliance

Concept: This alliance is widely distributed in the eastern United States and portions of adjacent Canada and includes dry mesic to mesic upland oak forests dominated by *Quercus alba* and/or *Quercus rubra*, with or without *Carya* species. Stands are 15-25 m tall, with a closed, deciduous canopy. The shrub and herbaceous strata are typically well-developed. *Quercus alba* usually dominates the stands, either alone or in combination with *Quercus rubra* (especially on moister sites) and sometimes *Quercus velutina* (especially on drier sites). Some associations in this alliance are dominated by *Quercus rubra*, although *Quercus alba* is usually also a canopy component. *Carya* species (particularly *Carya alba, Carya glabra* or *Carya ovata*) are typically common either in the canopy or subcanopy. In the southeastern United States, this alliance covers dry-mesic forests of the Piedmont, low Appalachian Mountains, and the Cumberland and Interior Low Plateau, and mesic oak-hickory forests of the Blue Ridge and the interior highlands of the Ozarks and Ouachita Mountains. Associated species in the southeastern United States include *Carya glabra, Carya ovata, Carya alba, Fraxinus americana, Acer rubrum, Acer leucoderme, Cornus florida, Nyssa sylvatica, Ostrya virginiana, Calycanthus floridus, Pyrularia pubera, Tilia americana var. caroliniana, Oxydendrum arboreum*, and others. This alliance is found throughout the midwestern United States on moderately rich, upland sites. Typical associates include *Fraxinus americana, Ulmus americana, Tilia americana, Acer saccharum, Acer rubrum*, and more locally, *Quercus macrocarpa* and *Quercus ellipsoidalis*.

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

Comments:

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

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

Physiographic Province, Section, Subsection: 212Fb:CPP, 212Ht:CPP, 212Hx:CPP, 212Jj:C??, 212Ka:CC?, 212Kb:CCC, 212Mb:C??, 212Na:CCP, 212Nb:CC?, 212Nc:CCC, 212Nd:CC?, 221Ad:CCP, **221Ae:**CCC, 221Af:CCC, 221Ag:CCC, 221Ah:CCC, 221Ai:CCC, 221Ak:CCC, 221Al:CCC, **221Am:**CCC, **221Ba:**CCC, 221Bb:CCC, **221Da:**CCC, 221Db:CCC, **221Dc:**CCC, 221Ea:CCC, 221Ec:CCC, 221Ed:CCP, 221Ef:CCP, 221Eg:CCC, 221Ha:CCC, 221Hb:CCC, 221Hc:CCC, 221Hd:CCC, 221He:CCC, 221Ja:CCP, 221Jb:CCC, 222Aa:CCC, 222Ab:CCC, 222Ac:CCC, 222Ad:CCC, 222Ae:CCC, 222Af:CCC, 222Ag:CCC, 222Ah:CCC, 222Aj:CCC, 222Ak:CCC, 222Al:CCP, 222Am:CCC, 222An:CCC, 222Ao:CCC, 222Ap:CCC, 222Aq:CCC, 222Cb:CCC, 222Cc:CCC, 222Cd:CCC, 222Ce:CCC, 222Cf:CCC, 222Cg:CCC, 222Ch:CCC, 222Da:CCP, 222Db:CCC, 222Dc:CCC, 222Dd:CCP, 222De:CCC, 222Df:CCC, 222Dg:CCP, 222Dh:CCC, 222Di:CCC, 222Dj:CCP, 222Ea:CCC, 222Eb:CCC, 222Ec:CCC, 222Ed:CCC, 222Ee:CCC, 222Ef:CCC, 222Eg:CCC, 222Eh:CCC, 222Ei:CCC, 222Ej:CCP, 222Ek:CCC, 222Em:CCC, 222En:CCC, 222Eo:CCC, 222Fa:CCP, 222Fb:CCC, 222Fd:CCC, 222Fe:CCC, 222Ff:CCC, 222Ga:CCC, 222Gb:CCC, 222Gc:CCC, 222Ha:CCC, 222Hb:CCC, 222Hf:CCC, 222Id:CCP, 222If:CCC,

222Ja:CCC, 222Jb:CCC, 222Jc:CCC, 222Jg:CCC, 222Jh:CCC, 222Ji:CCC, 222Jj:CCC, 222Ke:CCC, 222Kf:CCC, 222Kg:CCC, 222Kh:CCC, 222Kj:CCC, 222Lb:CCC, 222Lc:CCC, 222Le:CCC, 222Lf:CCC, 222Ma:CCC, 222Mb:CCC, 222Mc:CCC, 222Md:CCC, 222Me:CCC, 222Qb:CCC, 231Aa:CCC, 231Ab:CCC, 231Ac:CCC, 231Ad:CCC, 231Ae:CCC, 231Af:CCC, 231Ag:CCC, 231Ah:CCC, 231Ak:CCC, 231Al:CCC, 231Am:CCC, 231An:CCC, 231Ao:CCC, 231Ap:CCC, 231Ba:CCP, 231Bb:CCP, 231Bc:CCP, 231Bd:CCP, 231Be:CCC, 231Bg:CCP, 231Bh:CCP, 231Bk:CCP, 231Ca:CCC, 231Cb:CCC, 231Cc:CCC, 231Cd:CCC, 231Cf:CCC, 231Da:CCC, 231Dc:CCC, 231Dd:CCC, 231De:CCC, 231E:CC, 231Gb:CCC, 232Aa:CCC, **232Ac:**CCP, 232Ad:CCC, 232Bq:CCC, 232Br:CCC, 232Bt:CCC, 232Bv:CCC, 232Bx:CCC, 232Ca:CCC, 232Cb:CCC, 234Ac:PPP, 251Aa:CCC, 251Ba:CCC, 251Be:CCC, 251Ca:CC?, 251Cb:CCC, 251Cc:CCC, 251Cd:CCC, 251Ce:CCC, 251Cf:CCC, 251Cg:CCC, 251Ch:CCC, 251Cj:CCC, 251Ck:CCC, 251Cn:CC?, 251Co:CC?, 251Cp:CCC, 251Cq:CCC, 251Dc:CCC, 251Dd:CCC, 251De:CCC, 251Df:CCC, 251Dh:CCP, 251Ea:CCC, M212Bd:CCC, M212Cb:CCC, M212Cc:CCC, M221Aa:CCC, M221Cd:CCC, M221Dc:CCC, M221Dd:CCC, M222Aa:CCC, M222Ab:CCC, M231Aa:CCC, M231Ab:CCC, M231Ac:CCC, M231Ad:CCC

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

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

Authors: D.J. ALLARD/D. FABER-LANG, KP, MCS **Identifier:** A.239

QUERCUS (ALBA, RUBRA, VELUTINA) / CORNUS FLORIDA / VIBURNUM ACERIFOLIUM FOREST
(White Oak, Northern Red Oak, Black Oak) / Flowering Dogwood / Mapleleaf Viburnum Forest
[Mesic Oak Forest]

G?
S4S5 01-08-15

State Estimated EO's: CD—Perhaps 50–150 occurrences.
State Area: D—Estimated >10,000 acres in state. Patch sizes may range from 10–1,000 acres.

Concept: This northeastern oak—hickory forest occurs on well-drained loamy sand of knolls and upper slopes. This vegetation is ecologically transitional between dry-rich oak—hickory forests of relatively high diversity and dry, acidic oak species-poor forests.. *Quercus alba* and *Quercus velutina* are prominent in the canopy, with *Quercus rubra* also important on the New Jersey Coastal Plain and in New England, and *Quercus prinus* and *Quercus coccinea* typical associates in the southern portion of the range. Typical hickory species include *Carya glabra, Carya ovata* and *Carya ovalis*. Other canopy associates may include *Acer rubrum, Sassafras albidum, Amelanchier arborea, Ostrya virginiana*, and *Fraxinus americana*. At the northern range limit of this type, *Pinus strobus* and *Betula lenta* also occur as minor associates. *Cornus florida* is a characteristic understory tree. The shrub layer is characterized by *Viburnum acerifolium*, with other

frequent associates including *Hamamelis virginiana, Vaccinium corymbosum, Corylus cornuta*, and *Corylus americana*. A dwarf-shrub layer may be present, characterized by *Vaccinium pallidum* and *Gaylussacia baccata*, with *Vaccinium angustifolium* occurring more frequently to the north. The herbaceous layer is characterized by *Carex pensylvanica, Maianthemum racemosum (= Smilacina racemosa), Aralia nudicaulis, Hieracium venosum, Solidago bicolor, Desmodium glutinosum, Desmodium paniculatum, Melampyrum lineare, Chimaphila maculata, Eurybia divaricata (= Aster divaricatus), Aureolaria* spp., and *Helianthemum canadense*.

Comments:

Range:

Other States/Provinces: CT:S?, DE:S?, MA:S?, MD:S?, ME:S?, NH:S?, NY:S?, PA:S?, RI:S?, VA:S?, VT:S?

Physiographic Province, Section, Subsection: 221Ad:CCP, **221Ae:**CCC, 221Af:CCC, 221Ag:CCC, 221Ah:CCC, 221Ai:CCC, 221Ak:CCC, 221Al:CCC, **221Am:**CCC, **221Ba:**CCC, 221Bb:CCC, **221Da:**CCC, 221Db:CCC, **221Dc:**CCC, 232Aa:CCC, **232Ac:**CCP, 232Ad:CCC, 232Br:CCC, 232Bt:CCC, 232Bx:CC?, M212Bd:CCC, M212Cb:CCC, M212Cc:CCC

Synonymy: *Quercus alba—Carya (alba, glabra) / Cornus florida / Vaccinium pallidum* Forest

References: Breden 1989, Damman 1977, Hunt 1997, Maine Natural Heritage Program (MENHP) 1991, McCoy and Fleming 2000, Sperduto 1997b

Authors: ECS **Confidence:** 2 **Identifier:** CEGL006336

I.B.2.N.a.29. QUERCUS ALBA—QUERCUS (FALCATA, STELLATA) FOREST ALLIANCE

White Oak—(Southern Red Oak, Post Oak) Forest Alliance

Concept: This alliance contains vegetation that can be described as dry oak and oak—hickory forests. These are usually dominated by a mixture of *Quercus alba* and *Quercus falcata*; *Quercus stellata* may be dominant or codominant. In addition, *Quercus coccinea, Quercus velutina, Quercus marilandica, Carya alba, Carya glabra, Carya pallida, Carya carolinae-septentrionalis, Carya ovata*, and *Fraxinus americana* often are present. Common subcanopy and shrub species include *Oxydendrum arboreum, Acer rubrum, Ulmus alata, Juniperus virginiana var. virginiana, Vaccinium arboreum, Cornus florida, Sassafras albidum, Gaylussacia frondosa (= var. frondosa), Gaylussacia baccata, Vaccinium pallidum*, and *Vaccinium stamineum*. Herbaceous species that may be present include *Chimaphila maculata, Polystichum acrostichoides, Asplenium platyneuron, Hexastylis arifolia, Coreopsis major, Tephrosia virginiana, Sanicula canadensis, Desmodium nudiflorum, Desmodium nuttallii, Symphyotrichum urophyllum? (= Aster sagittifolius?), Symphyotrichum patens (= Aster patens), Solidago ulmifolia*, and *Hieracium venosum*. These often are successional forests following logging and/or agricultural cropping. Some examples occur in upland flats and have been called xerohydric because they occasionally will have standing water in the winter due to a perched water table, but are droughty by the end of the growing season. Other occurrences are found on well-drained sandy loam or clay loam soils that are often, although not always, shallow. Karst topography can be found in areas where this alliance occurs. Soils are most often a well-drained sandy loam, although clay loams are not uncommon. Forests of this alliance may occupy narrow bands of dry-mesic habitat transitional between lower and midslope mesic communities and xeric ridgetops. This alliance is found in the Upper East Gulf Coastal Plain, Piedmont, low mountains (including Cumberlands and Ridge and Valley), and Interior Low Plateau. Distribution in the Atlantic Coastal Plain, East Gulf Coastal Plain, and Upper West Gulf Coastal Plain needs assessment. In the Shawnee Hills, Knobs, Coastal Plain, and Appalachian Plateau regions of Kentucky, these forests form a common matrix vegetation over acid sandstone and shales. These Kentucky forests

are dominated by *Quercus alba* with little or no *Quercus falcata* and occupy middle to upper slope positions. In the southern Illinois portion of the range, examples occur on south- to west-facing slopes where increased temperatures favor *Quercus falcata* over *Quercus rubra*.

Comments:

Range: This alliance is found in southern Illinois, Kentucky, Tennessee, Arkansas, Louisiana (?), Oklahoma (?), Texas (?), Mississippi, Alabama, Georgia, South Carolina, North Carolina, Virginia, Delaware, Maryland, and New Jersey. This alliance is found in the Upper East Gulf Coastal Plain, Piedmont, low mountains, and Interior Low Plateau. Distribution in the Atlantic Coastal Plain, East Gulf Coastal Plain, and Upper West Gulf Coastal Plain needs assessment. In the Shawnee Hills, Knobs, Coastal Plain, and Appalachian Plateau regions of Kentucky, these forests form a common matrix vegetation over acid sandstone and shales.

Other States/Provinces: AL AR CT DE GA IL IN? KY LA? MD MS NC NJ NY OK? SC TN TX? VA

Physiographic Province, Section, Subsection: 221Ad:CPP, **221Dc:**C??, 221Ha:CCP, 221Hc:CCC, 221Hd:CCP, 221He:CCP, 221Jb:CCC, 222Ca:CCP, 222Cb:CCC, 222Cc:CCP, 222Cd:CCP, 222Ce:CCP, 222Cf:CC?, 222Cg:CC?, 222Ch:CC?, 222Da:CCC, 222Dc:CCP, 222Dd:CCP, 222De:CCC, 222Df:CCP, 222Dg:CCC, 222Dh:CCC, 222Di:CCP, 222Dj:CCC, 222Ea:CCC, 222Eb:CCC, 222Ec:CCP, 222Ee:CCC, 222Ef:CCC, 222Eg:CCC, 222Eh:CCC, 222Ei:CCC, 222Ej:CCC, 222El:CCC, 222En:CCC, 231Aa:CCC, 231Ab:CCP, 231Ac:CCP, 231Ad:CCP, 231Ae:CCC, 231Af:CCC, 231Ag:CCC, 231Ah:CCP, 231Ai:CCC, 231Aj:CCP, 231Ak:CCC, 231Al:CCC, 231Am:CCC, 231An:CCC, 231Ao:CCC, 231Ap:CCC, 231Ba:CPP, 231Bc:CPP, 231Bd:CPP, 231Be:CP?, 231Ca:CCP, 231Cb:CCP, 231Cc:CCP, 231Cd:CCC, 231Ce:CCP, 231Cg:CCP, 231Da:CCC, 231Dc:CCC, 231De:CCC, 231Ea:CC?, 231Eb:CCC, 232Aa:CCC, **232Ab:CCC, 232Ac:CCC**, 232Ad:CCP, 232Bl:CCP, 232Bm:CCP, 232Bn:CCP, 232Bq:CCC, 232Br:CCC, 232Bt:CCC, 232Bv:CCP, 232Bx:CCP, 232Bz:CCP, 232Ca:CP?, 232Ch:CP?, 232Fa:CP?, 234Aa:CC?, 234Ab:CCC, 234Ac:CCP, 234Ae:CCC, 234Ag:CC?, 234Ah:CCP, M221Aa:CC?, M221Ab:CCC, M221Da:CCC

Synonymy: IA6i. Interior Upland Dry-Mesic Oak—Hickory Forest, in part (Allard 1990); Acidic sub-xeric forest, in part (Evans 1991); Xerohydric flatwoods, in part (Evans 1991); Dry-Mesic Oak—Hickory Forest, in part (Schafale and Weakley 1990); Southern Red Oak RV (Pyne 1994); Post Oak-Black Hickory Series (Diamond 1993); Submesic Oak—Hickory Forest, in part (Foti 1994b); TIB4aIV. *Quercus falcata—Quercus spp*. (Foti et al. 1994); White Oak—Black Oak—Northern Red Oak: 52, in part (Eyre 1980)

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

Authors: M. PYNE/A.S. WEAKLEY 6-94, KP, SCS **Identifier:** A.241

QUERCUS (FALCATA, ALBA, VELUTINA) / GAYLUSSACIA BACCATA—VACCINIUM PALLIDUM FOREST
(Southern Red Oak, White Oak, Black Oak) / Black Huckleberry—Hillside Blueberry Forest

G4G5
S3S4 01-08-15

State Estimated EO's: C
State Area: D—More than 10,000 acres in state. Patch size 50–400 acres.

Concept: This oak forest of the unglaciated northeastern Coastal Plain occurs on well-drained acidic soils, generally sandy loam and silt/clay. The canopy is dominated by a mixture of oaks, such as *Quercus alba, Quercus falcata*, and *Quercus velutina*. Associates

include *Sassafras albidum, Quercus coccinea, Quercus prinus, Quercus stellata, Liquidambar styraciflua, Nyssa sylvatica, Carya* spp., and *Pinus taeda*, with *Ilex opaca* and *Cornus florida* forming a subcanopy. The shrub layer is well-developed and dominated by ericaceous species such as *Gaylussacia baccata, Gaylussacia frondosa, Vaccinium pallidum*, and occasionally *Lyonia mariana*.

Comments:

Range:

Other States/Provinces: DE:S?, MD:S?, NC?, VA:S?

Physiographic Province, Section, Subsection: 232Ab:CCC, 232Ac:CCC, 232Ad:CCP, 232Br:CCC, 232Bt:CCC, 232Bx:CCP, 232Bz:CCP, 232Ch:CP?

Synonymy: Pine—oak assocation, in part (Shreve et al. 1910)

References: Shreve et al. 1910, Sneddon et al. 1996

Authors: ECS **Confidence:** 2 **Identifier:** CEGL006269

I.B.2.N.a.31. QUERCUS FALCATA FOREST ALLIANCE

Southern Red Oak Forest Alliance

Concept: Dry oak forests with canopies characteristically dominated by *Quercus falcata*, typically with some combination of *Quercus stellata, Quercus velutina*, and *Quercus coccinea*. The relative dominance of these four species is variable between associations across the range of this alliance. *Quercus alba* may be present (although more likely in the understory than in the canopy), but it will rarely contribute to the dominance. Within its range, some examples have strong dominance by *Quercus coccinea*. In the Atlantic Coastal Plain, *Quercus nigra* may be the other oak sharing dominance with *Quercus falcata*. *Vaccinium* spp. are common in the understory of often successional stands on subxeric, intermediate sites; some examples are found on sites with unusual soil conditions, such as hardpans with retarded drainage. These typically occur in upland flats and have been called xerohydric because they occasionally will have standing water in the winter due to a perched water table, but are droughty by the end of the growing season. Other occurrences are found on well-drained sandy loam or clay loam soils that are often, although not always, shallow. The range of forests of this alliance is throughout the East Gulf Coastal Plain, Piedmont, Carolina Sandhills, low mountains, and Cumberland and Interior Low Plateaus. The overall distribution in the Atlantic Coastal Plain and Ouachita Mountains needs assessment.

Comments: This alliance is found in central and western Tennessee and Kentucky, rather than the montane portions of these states. There is a *Quercus coccinea*-dominated association in Tennessee (S. Major pers. comm.).

Range: This alliance is found from Oklahoma, Kentucky, and North Carolina, south to Louisiana, Mississippi, and South Carolina, in the East Gulf Coastal Plain, Upper West Gulf Coastal Plain, Piedmont, Cumberland Plateau, Carolina Sandhills, low mountains, Interior Low Plateau, Ozarks, and Ouachitas. Its distribution and extent in the Atlantic Coastal Plain needs assessment. It is also reported from the Chesapeake Bay Region and the Northern Piedmont.

Other States/Provinces: AL AR DE GA IN? KY LA MD MS NC NJ OK SC TN TX?

Physiographic Province, Section, Subsection: 221Hc:CPP, 221Ja:CCP, 221Jb:CCC, 222Cb:CCC, 222Cc:CCP, 222Ce:CCP, 222Da:CCC, 222Dc:CC?, 222Dg:CCC, 222Eb:CCC, 222Ej:CCC, 222El:CCC, 231Aa:CCC, 231Ae:CC?, 231Cd:CCC, 231E:CC, **232Ab:**CCC, **232Ac:**CCP, 232Ba:CCP, 232Bb:CCP, 232Bh:CCP, 232Bi:CC?, 232Bk:CCP, 232Bl:CCP, 232Bm:CCP, 232Bn:CCP, 232Bo:CCP, 232Bp:CCP, 232Bq:CCC, 232Br:CCP, 232Bt:CCC, 232Bu:CCP, 232Bv:CC?, 232Bx:CCC, 232Bz:CCP, 232Ca:CC?, 232Ce:CC?, 232Ci:CCC, 232Fa:CCP, 232Fb:CCP, 234Aa:CCP, 234Ab:CCC, 234Ac:CCC, 234Ae:CCC, 234Ag:CCP, 234Ah:CC?, 234Am:CC?, 234An:CCP, M222Ab:CCC, M231Aa:CCP, M231Ab:CCP, M231Ac:CCP, M231Ad:CCP

Synonymy: Acidic Xeric Forest, in part (Evans 1991); Xerohydric flatwoods, in part (Evans 1991); Dry Oak—Hickory Forest, Coastal Plain Sand Variant (Schafale and Weakley 1990); *Quercus falcata—Carya alba* forest association (Hoagland 1997); Southern Red Oak RV (Pyne 1994); Post Oak-Black Hickory Series (Diamond 1993); No equivalent (Eyre 1980)
References: Andreu and Tukman 1995, Evans 1991, Hoagland 1997, Pyne 1994, S. Major pers. comm., Schafale and Weakley 1990, Wharton 1945
Authors: M. PYNE/A.S. WEAKLEY 2-96, KP, SCS **Identifier:** A.243

QUERCUS FALCATA—QUERCUS PHELLOS / ILEX OPACA FOREST
Southern Red Oak—Willow Oak / American Holly Forest

G?
S2S3 01-08-15

State Estimated EO's: C—Estimate 30–100 occurrences.
State Area: U—Estimate between 750–3,000 acres in state. Patch size probably ranges from 5–50 acres.

Concept: This community is a mesic oak forest of the central Atlantic Coastal Plain. In general, this vegetation borders wetlands. Canopy dominants are *Quercus falcata, Quercus phellos, Quercus coccinea, Quercus alba, Quercus michauxii*, with *Liquidambar styraciflua* and *Acer rubrum* common associates. Pines may be present, including *Pinus rigida* or *Pinus echinata* in New Jersey, or *Pinus taeda* in Delaware and Maryland. The understory is evergreen, characterized by *Ilex opaca, Kalmia latifolia*, and *Vaccinium corymbosum*. The shrubs *Gaylussacia frondosa, Gaylussacia baccata* form a patchy layer, and the herb layer is sparse.
Comments:
Range:
Other States/Provinces: DE:S?, MD:S?,
Physiographic Province, Section, Subsection: 232Ab:CCC, **232Ac:**CCP, 232Bt:CCC, 232Bx:CCC, 232Bz:CC?
Synonymy: Oak—southern hardwood "peri-hydric" forest (Windisch unpublished data)
References: Breden 1989
Authors: ECS **Confidence:** 2 **Identifier:** CEGL006390

I.B.2.N.a.101. QUERCUS MUEHLENBERGII—(ACER SACCHARUM) FOREST ALLIANCE

Chinquapin Oak—(Sugar Maple) Forest Alliance

Concept: This alliance includes a variety of dry, dry-mesic, and mesic forests, dominated by *Quercus muehlenbergii* and possibly *Acer saccharum*, the canopy often also including other hardwood species associated with high base substrates (e.g., limestone or dolomite) under a variety of moisture conditions. These include *Quercus alba, Quercus shumardii, Fraxinus americana, Fraxinus quadrangulata, Acer barbatum, Tilia americana, Carya* spp., *Juglans nigra*, and *Liriodendron tulipifera* (in the more interior portions of the alliance's distribution), and *Quercus sinuata var. sinuata* and *Carya myristiciformis* (in the southwestern, Coastal Plain portion of the alliance's distribution). The habitat of this alliance includes mesic and dry-mesic forests over limestones in the Nashville Basin of Tennessee, dry-mesic slopes associated with prairie openings in Louisiana, moist limestone slopes in the Edwards Plateau of Texas, blackland soils in the upper West Gulf Coastal Plain of Arkansas, lowlands and mesic slopes of Oklahoma and adjacent Arkansas, as well as related habitats in states farther east (e.g., Alleghenies and lower Cumberland Plateau escarpment). Forests in Kentucky and Tennessee have *Quercus shumardii* and *Frangula caroliniana* and occur over limestone on south-facing slopes.

There are scattered occurrences on benches and clifftops on the Daniel Boone National Forest. In the Coastal Plain of Virginia, this alliance is represented by somewhat open canopy 'shell barren' forests dominated by *Quercus muehlenbergii* with *Acer barbatum*. On rare occurrences of limestone in the Southern Blue Ridge of North Carolina, *Quercus muehlenbergii* occurs with *Juglans nigra, Fraxinus americana*, and *Acer saccharum*. Understory species may include *Cornus florida, Cercis canadensis, Calycanthus floridus, Cornus alternifolia, Ostrya virginiana*, and *Hydrangea arborescens*. In the Northeast, the shrub layer is sparse and may contain *Hamamelis virginiana, Zanthoxylum americanum*, and *Cornus alternifolia*. In some more southerly examples, shrubs may include *Forestiera ligustrina, Frangula caroliniana*, and *Symphoricarpos orbiculatus*. The herbaceous layer may contain *Asclepias quadrifolia, Clematis occidentalis (= Clematis verticillaris)* (in northeastern examples), *Packera obovata (= Senecio obovatus), Phryma leptostachya, Saxifraga virginiensis, Arabis laevigata*, and *Triosteum aurantiacum*. Two unusual communities of this alliance are lowland forests from the Upper West Gulf Coastal Plain of Arkansas. In the Northeast, the habitat is characterized as upper slopes or summits of limestone or marble ridges with dry soil-moisture regimes. Limestone outcrops or boulders may be present, as well as Karst collapse features. In the Southeast, mesic to dry limestone-derived soils may occur as well on flatter landforms, as in the Nashville Basin of Tennessee. In the Southeast, this vegetation is known from the Ridge and Valley, lower Cumberland Plateau escarpment, Highland Rim escarpment, and Nashville Basin in Tennessee; the Highland Rim, Bluegrass and Dripping Springs escarpment in Kentucky; the Cumberland Plateau in Alabama; as well as rarely in the Southern Blue Ridge and Coastal Plain. Isolated occurrences are reported in northern Arkansas on moderately shallow soils, often on glade margins. It also occurs in the Arbuckle Mountains of Oklahoma and the Edwards Plateau of Texas. If this alliance occurs in the Upper East Gulf Coastal Plain, stands would contain *Acer barbatum* instead of *Acer saccharum*.

Comments: This alliance was created by the merger of the former *Acer saccharum—Quercus muehlenbergii* Forest Alliance and the former *Quercus muehlenbergii* Forest Alliance. MP 6-01: On the southern flank of the alliance's distribution, the sugar maple which is present is *Acer barbatum* (= *Acer saccharum var. floridanum*), not *Acer saccharum var. saccharum*. Is this a problem?

Range: This alliance may be found in Alabama, Arkansas, Kentucky, Louisiana, North Carolina, Oklahoma, South Carolina (?), Tennessee, Texas, Connecticut, Maryland, Massachusetts, New Jersey, New York, Pennsylvania, Vermont, Virginia, West Virginia, Illinois, Indiana, Michigan (?), Missouri, Nebraska (?), and Ohio, and in Canada in Ontario. In the Southeast, this vegetation is known from the Ridge and Valley, lower Cumberland Plateau escarpment, Highland Rim escarpment, and Central Basin in Tennessee; the Highland Rim, Bluegrass and Dripping Springs escarpment in Kentucky; the Cumberland Plateau in Alabama; as well as rarely in the Southern Blue Ridge and coastal plain. Isolated occurrences are reported in northern Arkansas on moderately shallow soils, often on glade margins. It also occurs in the Arbuckle Mountains of Oklahoma and the Edwards Plateau of Texas.

Other States/Provinces: AL AR CT GA IL? IN KY LA MA MD MI? NC NJ NY OH OK ON PA SC? TN TX VA VT WV

Physiographic Province, Section, Subsection: 212B:CC, 212E:CC, 221A:CC, **221B:**CC, **221Dc:**CC?, 221E:CC, 221Hb:CCC, 221Hc:CCC, 221Hd:CCP, 221Ja:CCC, 221Jb:CCC, 221Jc:CCP, 222An:CC?, 222Df:CCP, 222Dg:CCC, 222Ea:CC?, 222Eb:CCC, 222Ec:CCC, 222Ed:CCC, 222Ee:CCC, 222Ef:CCC, 222Eg:CCC, 222Eh:CCC, 222Ej:CCC, 222En:CCC, 222Eo:CCP, 222Fa:CCP, 222Fb:CCC, 222Fc:CC?, 222Fd:CCC, 222Fe:CCP, 222Ff:CCP, 222Ha:CCC, 222Hb:CCC, 222Hc:CCC, 222I:CC, 231Ba:CP?, 231Cc:CCP, 231Cd:CCC, 231Ce:CCP, 231Cf:CCP, 231Cg:CCP, 231Da:CCP, 231Dc:CCP, 231De:CCC, 231Ea:CCP, 231Eb:CCC, 231Gc:CCC, 232Br:CCC, 232Ch:C??, 232Fa:CCC, 251Ea:P??, 251Eb:P??,

251Ec:P??, 251Ed:P??, 255Af:CCC, 311A:CC, 315D:CC, M212B:CC, M212C:CC, M221Aa:CCC, M221Ab:CCP, M221Ac:CCC, M221Be:CPP, M221Cb:CPP, M221Ce:CPP, M221Dc:CCC, M221Dd:CCC

Synonymy: IA6k. Sugar Maple—Oak—Hickory Forest, in part (Allard 1990); Sugar Maple—Oak—Hickory Forest, in part (Pyne 1994); IA6j. Interior Calcareous Oak—Hickory Forest. in part? (Allard 1990); Calcareous xeric forest, in part (Evans 1991); Calcareous sub-xeric forest, in part (Evans 1991); Calcareous mesophytic forest, in part (Evans 1991); Basic Mesic Forest, Montane Calcareous Subtype (Schafale and Weakley 1990); *Quercus muehlenbergii—Acer saccharum* forest association (Hoagland 1997); Bigtooth Maple—Oak Series, in part (Diamond 1993); Sugar Maple: 27, in part (Eyre 1980)

References: Allard 1990, Andreu and Tukman 1995, Bowen et al. 1995, Campbell 1980, Crites and Clebsch 1986, Evans 1991, Eyre 1980, Faber-Langendoen et al. 1996, Fowells 1965, Hoagland 1997, Pyne 1994, Schafale and Weakley 1990, Ware and Ware 1992

Authors: D.J. ALLARD/D. FABER-LANG, MP, SCS **Identifier:** A.1912

ACER SACCHARUM—QUERCUS MUEHLENBERGII / CERCIS CANADENSIS FOREST

Sugar Maple—Chinquapin Oak / Redbud Forest

[Appalachian Sugar Maple—Chinquapin Oak Limestone Forest] **G4?** 00-10-19

S? 01-08-15

State Estimated EO's: ?—Not confirmed to exist in New Jersey.

State Area: U

Concept: This circumneutral to basic maple—oak forest is found in the Central Appalachians and adjacent regions of the eastern United States, ranging south and west to the Interior Low Plateau of Tennessee and the Cumberlands of Alabama. Stands occur in thin soils over calcareous substrates, sometimes in association with limestone glades. These are typically closed-canopy, rich, dry to dry-mesic forests; in some stands the canopy may vary from closed to somewhat open. The stands are primarily composed of *Acer saccharum, Quercus muehlenbergii, Fraxinus americana*, and *Ostrya virginiana*. Associates include *Quercus alba, Tilia americana, Acer nigrum, Ulmus rubra, Celtis occidentalis, Carya ovalis*, and *Carya ovata*. *Quercus prinus* may also be present in some examples. A variable subcanopy and shrub layer contains *Cornus florida, Cercis canadensis, Hamamelis virginiana, Rosa carolina, Rhus aromatica, Viburnum prunifolium, Viburnum rafinesquianum, Viburnum rufidulum*, and *Zanthoxylum americanum*. The sparse to well-developed herb layer may contain *Danthonia spicata, Elymus hystrix, Bouteloua curtipendula, Ageratina altissima (= Eupatorium rugosum), Antennaria plantaginifolia, Aquilegia canadensis, Arabis laevigata, Asclepias quadrifolia, Clematis occidentalis* (to the north), *Houstonia longifolia (= Houstonia tenuifolia), Polygonum scandens, Sanicula canadensis, Saxifraga virginiensis*, and *Packera obovata (= Senecio obovatus)*. Some other herbs recorded in Virginia examples include *Agrimonia rostellata, Anemone virginiana var. virginiana, Symphyotrichum patens var. patens (= Aster patens var. patens), Bromus pubescens, Dichanthelium boscii, Erigeron pulchellus var. pulchellus, Galium circaezans, Sanicula canadensis, Scutellaria elliptica*, and *Solidago ulmifolia var. ulmifolia*. Some stands attributed to this type are mesic forests of steep slopes in the southern Ridge and Valley which are dominated by *Acer saccharum* and some combination of *Quercus alba* and/or *Quercus muehlenbergii* with *Liriodendron tulipifera, Carya* spp., and *Aesculus flava* in either the canopy or subcanopy. The same, or related forests, are reported from limestones of the lower Cumberland Plateau escarpment of Tennessee and possibly Alabama.

Comments: The range of this type, which was initially described from "the High Alleghenies," has gradually extended south to at least the Interior Low Plateau. It may require subdivision. (This type was formerly attributed questionably to the Upper East Gulf Coastal Plain, it was dropped from ECO43 by REE based on input from MP and

ASW). Some stands attributed to this type are mesic forests of steep slopes in the southern Ridge and Valley which are dominated by *Acer saccharum* and some combination of *Quercus alba* and/or *Quercus muehlenbergii* with *Liriodendron tulipifera, Carya* spp., and *Aesculus flava* in either the canopy or subcanopy (Andreu and Tukman 1995). The same, or related forests, are reported from limestones of the lower Cumberland Plateau escarpment of Tennessee and possibly Alabama (Bowen et al. 1995). There has been discussion of the merits of subdividing this type, in effect re-splitting former *Acer saccharum—Quercus (alba, muehlenbergii) / Aesculus flava* Forest (CEGL006136) (or an equivalent) out of it again.

Range: This maple—oak forest is found in the Central Appalachians and adjacent regions of the eastern United States, including the Ridge and Valley and Western Allegheny Plateau regions, ranging from Pennsylvania and possibly New Jersey southward to the Interior Low Plateau of Tennessee and the Ridge and Valley of Virginia.

Other States/Provinces: AL?, KY:S?, MD:S?, NJ?, PA:S?, TN:S?, VA:S?, WV:S?

Physiographic Province, Section, Subsection: 221A:C?, **221D:**C?, 221E:CC, 221Hb:CCC, 221Hc:CCC, 221Jb:CCC, 222Ej:CPP, 222Fd:CCC, 231B:P?, 231Cc:PPP, M221Aa:CCC, M221Ac:CCC, M221Be:CPP, M221C:CP, M221D:C?

Synonymy: *Acer saccharum—Quercus (alba, muehlenbergii)* Forest (Andreu and Tukman 1995), *Quercus muhlenbergii—Acer (nigrum, saccharum var. saccharum) / Ostrya virginiana / Senecio obovatus* Forest, Type 3.1 (Fleming 1999), Yellow oak—redbud woodland (Fike 1999), Yellow oak-sugar maple-red bud forest of calcareous upper slopes and summits (CAP) (Fike 1999)

References: Andreu and Tukman 1995, Bartgis 1985a, Bartgis 1993, Bowen et al. 1995, Fike 1999, Fleming 1999

Authors: L.A. Sneddon, mod. M. Pyne after Fleming 1999, ECS **Confidence:** 2 **Identifier:** CEGL006017

ACER SACCHARUM—QUERCUS MUEHLENBERGII FOREST

Sugar Maple—Chinquapin Oak Forest

[Sugar Maple—Chinquapin Oak Forest] **G?** 96-10-03

S2 01-08-15

State Estimated EO's: B—Probably less than 20 occurrences >40 acres.

State Area: C—Estimate between 2,000–5,000 acres in New Jersey. Patch size probably ranges from 40–1,000 acres.

Concept: This dry-mesic forest community is found from the northeastern seaboard to the central United States and Canada on calcareous substrates. Stands occur on upper slopes or summits of limestone or marble ridges with dry soils. Limestone outcrops or boulders are often present. The tree canopy is dominated by *Quercus muehlenbergii*, the diagnostic dominant, and *Acer saccharum*. Oaks in general comprise at least 50% of the stand and maple at least 20%. In Ohio, other oak associates include *Quercus alba, Quercus rubra*, and, locally, *Quercus shumardii*. Other hardwoods include *Carya ovata, Celtis occidentalis, Fraxinus americana, Fraxinus quadrangulata*, and *Tilia americana*. In the northeastern states, *Carya ovata* and *Quercus rubra* are the associated species. Shrub and small tree species include *Amelanchier sanguinea, Carpinus caroliniana, Cercis canadensis, Cornus racemosa, Diervilla lonicera, Lindera benzoin* and *Staphylea trifolia*. Herbaceous species include *Carex eburnea, Carex platyphylla*, and *Sanicula marilandica*, among many others.

Comments: Anderson (1996) provides further references for Ohio. He notes that it occurs mainly in northern Ohio, where it is primarily a calcareous substrate type but can also represent a transition from oak stands around prairies to beech—maple forests. In Illinois, this type may have occurred as a mesic sand forest subtype, e.g., around Peoria, where both sugar maple and chinquapin oak are noted in the General Land Office

(presettlement) Survey notes. Stands on thin soil over dolomite may overlap with limestone woodlands (e.g., in New York *Quercus alba—Quercus macrocarpa / Andropogon gerardii* Wooded Herbaceous Vegetation (CEGL005121)). *Acer saccharum—Quercus muehlenbergii / Cercis canadensis* Forest (CEGL006017) is a related unglaciated type found to the south of this type.

Range: This dry-mesic forest community is found from the northeastern seaboard to the north-central United States on calcareous substrates.

Other States/Provinces: CT:S?, IL?, MA?, MI?, NY:S?, OH:S?, ON:S?

Physiographic Province, Section, Subsection: 212B:CC, 212E:CC, 221A:CC, **221B:**CC, **221D:**CC, 222Ha:CCC, 222Hb:CCC, 222Hc:CCC, 222I:CC, 231:C, M212B:CC, M212C:CC, M221:C

Synonymy: Yellow oak-sugar maple calcareous forest (CAP)

References: Anderson 1996

Authors: D. Faber-Langendoen, mod. L. Sneddon, ECS **Confidence:** 3 **Identifier:** CEGL005010

I.B.2.N.a.36. QUERCUS PRINUS—(QUERCUS COCCINEA, QUERCUS VELUTINA) FOREST ALLIANCE

Rock Chestnut Oak—(Scarlet Oak, Black Oak) Forest Alliance

Concept: This alliance includes xeric oak forests strongly dominated by *Quercus prinus* or *Quercus prinus* with admixtures of *Quercus coccinea* and/or *Quercus velutina*, occurring in the southern and central Appalachians, Ridge and Valley, Cumberland Plateau, Piedmont, Interior Low Plateau, and possibly in the northern Appalachians. In the Piedmont and Ridge and Valley, and in areas transitional to these provinces, *Quercus stellata* and *Quercus marilandica* may be canopy associates. Other canopy/subcanopy associates include *Acer rubrum, Amelanchier arborea, Carya alba, Carya glabra, Cornus florida, Hamamelis virginiana, Magnolia fraseri, Nyssa sylvatica, Oxydendrum arboreum, Pinus rigida, Pinus strobus, Quercus alba, Quercus rubra, Robinia pseudoacacia*, and *Sassafras albidum*. In the Appalachians, a dense ericaceous shrub layer is characteristic, with species such as *Gaylussacia baccata, Gaylussacia ursina, Kalmia latifolia, Leucothoe recurva, Rhododendron maximum, Vaccinium pallidum*, and *Vaccinium stamineum*. In the upper Piedmont *Kalmia latifolia, Vaccinium arboreum*, and *Vaccinium pallidum* are common. In the montane distribution of this alliance, forests of this alliance have replaced forests formerly dominated or codominated by *Castanea dentata*, and chestnut sprouts are common in the understory. Other shrub species found in forests of this alliance include *Chionanthus virginicus, Diospyros virginiana, Robinia hispida, Sassafras albidum, Styrax grandifolius, Symplocos tinctoria, Viburnum acerifolium, Viburnum prunifolium*, and *Viburnum rufidulum*. Herbaceous cover is typically sparse in these dry, rocky forests and species vary with geographic location. Some typical herbaceous species include *Antennaria plantaginifolia, Aureolaria laevigata, Chamaelirium luteum, Chimaphila maculata, Danthonia spicata, Dichanthelium commutatum, Dichanthelium dichotomum, Dioscorea quaternata, Epigaea repens, Galax urceolata, Galium latifolium, Gaultheria procumbens, Goodyera pubescens, Hieracium venosum, Lysimachia quadrifolia, Medeola virginiana, Monotropa uniflora, Potentilla canadensis, Pteridium aquilinum, Stenanthium gramineum, Uvularia puberula*, and *Uvularia sessilifolia*. These forests occur on convex, upper slopes and ridgetops, south-facing slopes, over thin, rocky, infertile soils in the Appalachians, typically below 3500 feet (1066 m), where windthrow and ice damage are common natural disturbances. In the Piedmont these forests occur on low mountains and hills, on rocky, well-drained, acidic soils, sometimes associated with outcrops of quartzite, or other resistant rock.

Comments:

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

Other States/Provinces: AL CT DE GA IL IN KY MA MD ME MS? NC NH NJ NY OH PA RI SC TN VA VT WV

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

Synonymy: IA6d. Chestnut Oak Slope and Ridge Forest (Allard 1990); IA7d. Piedmont Monadnock Forest (Allard 1990); Appalachian sub-xeric forest, in part (Evans 1991); Chestnut Oak Forest, in part (Schafale and Weakley 1990); Piedmont Monadnock Forests, in part (Schafale and Weakley 1990); Oligotrophic Forest, in part (Rawinski 1992); *Quercus prinus—Quercus velutina / Vaccinium stamineum* Association (Fleming and Moorhead 1996); Chestnut Oak: 44, in part (Eyre 1980)

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

Authors: D. FABER-LANGENDOEN/D.J. , KP, ECS **Identifier:** A.248

QUERCUS PRINUS—QUERCUS (RUBRA, VELUTINA) / GAYLUSSACIA BACCATA FOREST

Rock Chestnut Oak—(Northern Red Oak, Black Oak) / Black Huckleberry Forest

[Northern Appalachian Dry Oak Forest] **G3G5**

S3S4 01-08-15

State Estimated EO's: C—Estimate 30–100 occurrences.

State Area: D—Estimate >10,000 acres in state. Average patch size 100–1,000 acres.

Concept: This dry to xeric chestnut oak forest association of lower New England ranges to the northern Piedmont and central Appalachian Mountains. It occurs on upper slopes and ridgetops and is characterized by thin, nutrient-poor acidic soils. Windthrow, fire and ice damage are common natural disturbances. The tree canopy is closed to partially open and is dominated by *Quercus prinus*. *Quercus rubra, Quercus alba, Quercus velutina,*

Betula lenta, and *Acer rubrum* are common associates, with other less frequent trees including *Quercus coccinea, Amelanchier arborea, Carya alba, Carya glabra, Cornus florida, Nyssa sylvatica, Pinus rigida, Pinus strobus, Quercus alba, Robinia pseudoacacia*, and *Sassafras albidum*. A tall-shrub layer is generally lacking, but when present may include *Viburnum acerifolium, Hamamelis virginiana*, and *Viburnum prunifolium*. The low-shrub layer is well developed and comprised chiefly of ericaceous species, including *Vaccinium angustifolium, Vaccinium pallidum, Vaccinium stamineum, Gaylussacia baccata*, or *Kalmia angustifolia*. The herbaceous layer is of sparse to moderate cover and may include *Carex pensylvanica, Antennaria plantaginifolia, Aralia nudicaulis, Aureolaria laevigata, Gaultheria procumbens, Chimaphila maculata, Carex rosea, Carex pensylvanica, Comandra umbellata, Cypripedium acaule, Deschampsia flexuosa, Danthonia spicata, Dioscorea quaternata, Epigaea repens, Galium latifolium, Goodyera pubescens, Hieracium venosum, Lysimachia quadrifolia, Medeola virginiana, Monotropa uniflora, Potentilla canadensis, Pteridium aquilinum, Uvularia puberula*, and *Uvularia sessilifolia*.

Comments:

Range:

Other States/Provinces: CT:S?, DE:S?, MA:S?, MD:S?, ME:S?, NH:S1S3, NJ:S4, NY:S?, PA:S?, RI:S?, VA:S?, VT:S?, WV:S?

Physiographic Province, Section, Subsection: 221Ae:CCC, 221Af:CCC, 221Ag:CCC, 221Ah:CCC, **221Am:**CCC, **221Ba:**CCC, 221Bb:CCC, 221Bc:CCC, **221Da:**CCC, 221Db:CCP, **221Dc:**CCC, 221E:C?, 221F:C?, 221G:C?, M212Bb:CPP, M212Ca:CCC, M212Cb:CCC, M212Cc:CCC, M212De:CCC, M221Aa:CCC, M221Ab:CCC, M221Ac:CCC, M221Ad:CCC, M221Ba:CCC, M221Bb:CCC, M221Bc:CCC, M221Bf:CCC, M221Da:CPP

Synonymy: Black gum ridgetop forest (Fike 1999), Chestnut oak forest (NAP) (Fike 1999), Chestnut oak-black oak/ericad forest: (matrix) xeric, S- & SW-facing slopes (CAP) (Fike 1999)

References: Breden 1989, Clancy 1996, Collins and Anderson 1994, Fike 1999, Maine Natural Heritage Program (MENHP) 1991, Metzler and Barrett 1996, Reschke 1990, Shreve et al. 1910, Sperduto 1996

Authors: ECS **Confidence:** 2 **Identifier:** CEGL006282

I.B.2.N.a.37. QUERCUS PRINUS—QUERCUS (ALBA, FALCATA, RUBRA, VELUTINA) FOREST ALLIANCE

Rock Chestnut Oak—(White Oak, Southern Red Oak, Northern Red Oak, Black Oak) Forest Alliance

Concept: Dry-mesic to mesic forests dominated by *Quercus prinus* occurring in admixture with other *Quercus* species, in the Blue Ridge, Piedmont, Ridge and Valley, Cumberland Plateau, and the Interior Low Plateau. *Quercus prinus* is the leading dominant in these forests, but other common canopy species can include *Quercus alba, Quercus coccinea, Quercus falcata, Quercus rubra, Quercus velutina, Acer rubrum, Carya alba, Carya glabra, Carya ovalis, Carya ovata, Carya pallida, Fagus grandifolia, Liriodendron tulipifera, Nyssa sylvatica*, and *Pinus strobus*. The subcanopy often contains *Cornus florida* and *Oxydendrum arboreum*. Drier examples can contain *Juniperus virginiana var. virginiana*. Other common species in the subcanopy/shrub stratum include *Acer rubrum, Carya glabra, Cercis canadensis, Hamamelis virginiana, Kalmia latifolia, Nyssa sylvatica, Rhododendron calendulaceum, Rhododendron maximum, Robinia pseudoacacia, Stewartia ovata, Symplocos tinctoria, Vaccinium stamineum*, and *Viburnum acerifolium*. The ground flora varies depending on available light, moisture, and soil nutrients but can be quite diverse, especially in associations with sparse shrub cover. Herbaceous species characteristic of these dry-mesic to mesic oak—hickory forests include *Symphyotrichum cordifolium (= Aster cordifolius), Symphyotrichum retroflexum (= Aster curtisii), Eurybia*

macrophylla (= Aster macrophyllus), Symphyotrichum undulatum (= Aster undulatus), Botrychium virginianum, Carex nigromarginata, Chimaphila maculata, Actaea racemosa (= Cimicifuga racemosa), Collinsonia canadensis, Coreopsis major, Cypripedium parviflorum var. pubescens (= Cypripedium pubescens), Danthonia compressa, Danthonia spicata, Dioscorea villosa, Epigaea repens, Eupatorium album, Eupatorium purpureum, Galax urceolata, Galium triflorum, Houstonia purpurea (= Hedyotis purpurea), Hieracium venosum, Iris cristata, Maianthemum racemosum, Medeola virginiana, Melanthium parviflorum, Polystichum acrostichoides, Prenanthes altissima, Pycnanthemum incanum, Scutellaria ovata, Tephrosia virginiana, Uvularia perfoliata, and *Uvularia puberula*. Vines are common and species that may be present include *Parthenocissus quinquefolia, Smilax* spp., and *Toxicodendron radicans*. In the Cumberland Plateau, forests in this alliance have replaced forests once dominated by *Castanea dentata* and often have chestnut sprouts in the understory. Forests in this alliance are known from moderately sheltered low ridges, flats, and valleys at lower elevations (762–1036 m; 2500–3400 feet) in the Blue Ridge and from upper slopes, draws, and gorge slopes in the Cumberland Plateau, and from upper to middle, dry-mesic slopes in the Piedmont. This alliance provisionally includes forests over limestone in the lower portions of the Ridge and Valley.

Comments:

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

Other States/Provinces: AL GA? KY? MD? NC NJ NY SC TN VA WV?

Physiographic Province, Section, Subsection: 221Ha:CCC, 221Hb:CCC, 221Hc:CCC, 221He:CCP, 221Jb:CCC, 222Eb:CCC, 222Ec:CCC, 222Eg:CCC, 231Aa:CCP, 231Ac:CCP, 231Af:CCC, 231Ah:CCP, 231Ai:CCC, 231Bc:CCC, 231Bd:CCC, 231Be:CCC, 231Bk:CCC, 231D:CC, 232Aa:CCC, **232Ab:**CCC, **232Ac:**CCC, M221Aa:CCC, M221Ab:CCC, M221Cd:CCC, M221Dc:CCC, M221Dd:CCC

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

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

Authors: M.P. SCHAFALE/A.S. WEAKLE, KP, SCS **Identifier:** A.249

QUERCUS PRINUS—QUERCUS (ALBA, FALCATA, RUBRA, VELUTINA) FOREST [PLACEHOLDER]

Rock Chestnut Oak—(White Oak, Southern Red Oak, Northern Red Oak, Black Oak) Forest

G?

S? 01-08-15

State Estimated EO's: ?—Not yet ranked for New Jersey.

State Area: U

Concept: This is a placeholder for other community association(s) to be developed in this alliance for New Jersey and the Lower New England / Northern Piedmont Ecoregion (ECO61).

Comments:

Range:

Other States/Provinces:

Physiographic Province, Section, Subsection:
Synonymy:
References:
Authors: ECS **Confidence:** 3 **Identifier:** CEGL007260

QUERCUS PRINUS—QUERCUS VELUTINA / GAYLUSSACIA FRONDOSA FOREST
Rock Chestnut Oak—Black Oak / Dangleberry Forest
[Pine Barrens Hilltop Forest] **G?**
S3 01-08-15
State Estimated EO's: C—Between 20–100 occurrences in state. Lebanon SF, Fort Dix, Knolls
State Area: C—Estimated between 1,000–7,000 acres in state. Patch size <100 acres.

Concept: Small-patch forest of hilltops in the New Jersey pine barrens. *Quercus prinus* and *Quercus velutina* form 90% of the canopy cover. Understory is sparse, characterized by *Gaylussacia frondosa, Gaylussacia baccata, Quercus ilicifolia, Vaccinium pallidum*. The herb layer is sparse to absent, leaf litter is abundant. Mosses and lichens form a substantial bryophyte layer.
Comments:
Range:
Other States/Provinces: NY:S?
Physiographic Province, Section, Subsection: 232Aa:CCC, **232Ab:**CCC, **232Ac:**CCC
Synonymy: Oak hilltop forest of dry oak-pine (Breden 1989), Chestnut oak/heath forest (Windisch 1995b)
References: Breden 1989, Cain 1936, Conard 1935, McCormick 1979, Reschke 1990, Windisch 1995b
Authors: ECS **Confidence:** 2 **Identifier:** CEGL006334

I.B.2.N.a.38. QUERCUS PRINUS—QUERCUS RUBRA FOREST ALLIANCE
Rock Chestnut Oak—Northern Red Oak Forest Alliance

Concept: This alliance includes dry-mesic oak forests, codominated by *Quercus prinus* and *Quercus rubra*, at moderate elevations in the Blue Ridge, Ridge and Valley, and High Alleghenies of Virginia, western North Carolina, eastern Tennessee, South Carolina, and Georgia. It also includes transitional oak—hickory forests of Lower New England and the Northern Piedmont. This alliance may possibly range into the upper Piedmont and into the eastern fringes of the Cumberland Mountains and Appalachian Plateau of Kentucky, but no associations have been defined for these regions. The majority of the forests in this alliance occur in areas previously dominated by *Castanea dentata*, and chestnut sprouts are common in the understory. The canopy of forests in this alliance tend to be dominated by *Quercus rubra* and/or *Quercus prinus*, although other mesic hardwood species can codominate or be present in the canopy and subcanopy. Typical tree associates include *Liriodendron tulipifera, Acer rubrum, Hamamelis virginiana, Acer pensylvanicum*, and *Oxydendrum arboreum*. In the Appalachian Mountains, shrub layers are often dense and dominated by ericaceous species, *Rhododendron maximum* (especially on northerly aspects), *Rhododendron minus, Kalmia latifolia, Gaylussacia* spp., and *Vaccinium* spp. Herbaceous coverage tends to be inversely proportional to the shrub coverage. *Galax urceolata* and *Gaultheria procumbens* are components in sparse herb strata. Other herbs typical of these forests include *Solidago curtisii, Lysimachia quadrifolia, Thelypteris noveboracensis, Gentiana decora, Sanicula trifoliata, Prenanthes altissima, Dichanthelium* spp. (*Dichanthelium boscii, Dichanthelium commutatum, Dichanthelium dichotomum), Carex pensylvanica, Polystichum acrostichoides, Chimaphila maculata, Desmodium nudiflorum, Galium latifolium, Houstonia purpurea*, and *Maianthemum racemosum ssp. racemosum*. In montane landscapes, these forest occur on intermediate positions of elevation and aspect, on

protected, often rocky slopes. Forests in this alliance are also found on sandstone boulderfields and outcrops in Virginia's Ridge and Valley.

Comments:

Range: This alliance ranges from the southern Blue Ridge, north through the Ridge and Valley, and High Alleghenies of Virginia, and into some areas of Lower New England and the Northern Piedmont. This alliance may possibly range into the upper Piedmont and into the eastern fringes of the Cumberland Mountains and Appalachian Plateau of Kentucky, but no associations have been defined for these regions.

Other States/Provinces: GA KY MD? NC NJ? PA SC TN VA? WV?

Physiographic Province, Section, Subsection: 221Am:CPP, **221Da:**CPP, 221Db:CPP, 221Eb:C??, 221F:C?, 221G:C?, 221J:C?, 231Ag:???, M221Aa:CCC, M221Ab:CCC, M221Ac:CCC, M221Ad:CCC, M221Ba:CCC, M221Bb:CCC, M221Bc:CCC, M221Bd:CCC, M221Bf:CCC, M221Ca:C??, M221Cb:C??, M221Cc:C??, M221Cd:C??, M221Ce:C??, M221Da:CCC, M221Db:CCC, M221Dc:CCC, M221Dd:CCC

Synonymy: Appalachian sub-xeric forest, in part (Evans 1991); Chestnut Oak Forest, in part (Schafale and Weakley 1990); Dry-Mesic Oak—Hickory Forest, in part (Schafale and Weakley 1990); Oak—Chestnut—Hickory Forest (Ambrose 1990a); Oak—Hickory Forest, in part (Nelson 1986); *Quercus prinus—Quercus rubra / Acer pensylvanicum* Association (Fleming and Moorhead 1996); Chestnut Oak: 44, in part (Eyre 1980)

References: Ambrose 1990a, Evans 1991, Eyre 1980, Fleming and Moorhead 1996, Golden 1981, Livingston and Mitchell 1976, McLeod 1988, Mowbray 1966, Nelson 1986, Nowacki and Abrams 1992, Rheinhardt 1981a, Schafale and Weakley 1990

Authors: D.J. ALLARD 6-94, MOD. S., KP, SCS **Identifier:** A.250

Quercus prinus—Quercus rubra—Carya (glabra, alba) / Gaylussacia baccata Forest
Rock Chestnut Oak—Northern Red Oak—(Pignut Hickory, Mockernut Hickory) / Black Huckleberry Forest

G5?
S? 01-08-15

State Estimated EO's:—Not yet ranked in New Jersey.
State Area:

Concept: This closed-canopy, dry-mesic oak forest of the central Appalachian Mountains is a montane forest of protected, rocky slopes. The canopy is codominated by *Quercus prinus* and *Quercus rubra*. Associated canopy species include *Liriodendron tulipifera, Acer rubrum, Carya glabra*, and *Carya alba*. The tall-shrub layer, when present, is characterized by *Hamamelis virginiana* and *Acer pensylvanicum*. The lower shrub layer is dense and ericaceous, characterized by *Rhododendron maximum, Kalmia latifolia, Gaylussacia* spp., and *Vaccinium* spp. The herbaceous layer is usually sparse but may include *Gaultheria procumbens, Lysimachia quadrifolia, Thelypteris noveboracensis, Sanicula trifoliata, Prenanthes altissima, Dichanthelium boscii, Dichanthelium commutatum, Dichanthelium dichotomum, Carex pensylvanica, Polystichum acrostichoides, Chimaphila maculata, Desmodium nudiflorum, Galium latifolium, Houstonia purpurea*, and *Maianthemum racemosum*. This association is intermediate in elevation and aspect in relation to *Quercus prinus—Quercus coccinea* forests and *Quercus rubra* forests.

Comments:

Range:

Other States/Provinces: MD?, NJ?, PA:S?, WV?

Physiographic Province, Section, Subsection: 221Am:PPP, **221Da:**PPP, 221Db:PPP, 221E:P?, 221F:P?, 221G:P?, 231A:??, M221Aa:CCC, M221Ab:CCC, M221Ac:CCC, M221Ad:CCC, M221Ba:CCC, M221Bb:CCC, M221Bc:CCC, M221Bf:CCC, M221C:C?, M221Da:CCC

Synonymy: Chestnut oak-red oak/ericad forest: (matrix) N slopes (CAP)
References:
Authors: ECS **Confidence:** 3 **Identifier:** CEGL006057

I.B.2.N.a.39. QUERCUS RUBRA—(ACER SACCHARUM) FOREST ALLIANCE
Northern Red Oak—(Sugar Maple) Forest Alliance

Concept: This alliance, found in the midwestern, southeastern and eastern United States as well as Ontario, Canada, contains mesic forests dominated by *Quercus rubra*. Although *Acer saccharum* may not be dominant, its usual association with more mesic habitats makes it characteristic of this alliance. Ericaceous shrubs may be present but, except in some cases for *Kalmia latifolia*, are generally not prominent in these communities. Other canopy associates may include *Quercus alba, Quercus velutina, Betula lenta* (in the East), *Fraxinus americana, Tilia americana, Ulmus americana, Acer rubrum*, and *Fagus grandifolia*. In the East *Cornus florida* often forms a prominent subcanopy; in the Midwest *Prunus virginiana, Prunus serotina*, and *Ostrya virginiana* can do the same. Typical shrubs include *Hamamelis virginiana, Acer pensylvanicum* (in the North), *Lindera benzoin, Amelanchier* spp., and *Corylus cornuta*. *Viburnum acerifolium* is a characteristic shrub in this alliance. Herbs include *Polystichum acrostichoides, Medeola virginiana*, and *Geranium maculatum*. These forests typically occur on deep, moist to well-drained loams and silt loams on north and east midslopes and coves. In the Southeast, this alliance includes mesophytic forests associated with base-rich substrates in the Ozarks and the central Ouachita Mountains. These forests are found over soils derived from limestone or dolomite and occur on moist slopes or swales, mesic slopes, and upper floodplain terraces. Some characteristic species include *Acer saccharum, Quercus rubra, Quercus velutina, Carya cordiformis, Fraxinus americana, Ulmus americana, Liquidambar styraciflua, Celtis laevigata, Asimina triloba, Arundinaria gigantea, Elymus virginicus, Euonymus atropurpurea, Ilex decidua, Ilex opaca, Ostrya virginiana, Sapindus saponaria var. drummondii*, and *Staphylea trifolia*. In the southern Ouachita Mountains, *Acer barbatum* may be a component, rather than *Acer saccharum*. Stands may also occur on dry-mesic fine sandy loams and loamy sands. Historically, fire probably maintained stands in this alliance by decreasing competing woody species and improving light and moisture conditions for oak seedlings. Successful establishment of *Quercus rubra* and other associated oaks in this alliance is usually thought to require oak saplings in the understory prior to canopy disturbances or large-scale fires that remove competitors. Current *Quercus rubra*-dominated stands in parts of this alliance's range may result from a combination of natural and human-caused disturbances.

Comments:

Range: This alliance is found in Connecticut, Massachusetts, Maine, Maryland, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, Virginia, West Virginia (?), Arkansas, Kentucky, Oklahoma, Michigan, Minnesota, Missouri, Ohio (?), and Wisconsin, and in Canada in Ontario.

Other States/Provinces: AL? AR CT IA IL IN KY MA MD? ME MI MN MO NH NJ NY OH OK ON PA RI TN VA VT WI WV?

Physiographic Province, Section, Subsection: 212Ba:CC?, 212Bb:CCC, 212Ca:CCP, 212Cb:CCC, 212Da:CCC, 212Db:CC?, 212Dc:CCC, 212Ec:CPP, 212Ed:CPP, 212Fa:CCP, 212Fb:CCP, 212Fc:CCP, 212Fd:CCP, 212Ga:CCP, 212Gb:CCP, 212Hc:CCC, 212Hl:CCP, 212Hm:CCP, 212Hn:CCP, 212Ho:CCP, 212Hp:CCP, 212Hq:CCP, 212Hs:CCP, 212Ht:CCP, 212Hu:CCP, 212Hv:CCP, 212Hw:CCP, 212Hx:CCP, 212Hy:CCP, 212Ia:CCC, 212Ja:CCP, 212Jb:CCP, 212Jc:CCP, 212Jd:CCC, 212Jf:CC?, 212Jj:CCC, 212Jl:CCC, 212Jn:CCP, 212Jo:CCP, 212Kb:CPP, 212Lb:CCC, 212Lc:CCP, 212Ld:CC?, 212Na:CP?, 212Nb:CPP, 212Nd:CPP, 221Ad:CCP, **221Ae:**CCC, 221Af:CCP, 221Ag:CCP, 221Ah:CCP, 221Ai:CCP, 221Ak:CCC, 221Al:CCP, **221Am:**CCP, **221Ba:**CCP, 221Bb:CC?, 221Bc:CCP, **221Bd:**CCP,

221Da:CCP, **221Dc:**CCP, 221Ea:CCC, 221Eb:CC?, 221Ec:CCC, 221Ed:CCC, 221Ee:CCP, 221Ef:CCC, 221Eg:CCC, 221Fa:CCC, 221Fb:CCP, 221Hb:CCP, 221Hc:CCP, 221He:CCC, 222Ac:CCC, 222Ad:CC?, 222Ae:CC?, 222Aj:CCP, 222Ak:CCC, 222Am:CC?, 222Ao:CCC, 222Ap:CCC, 222Aq:CCC, 222Db:CCC, 222Dc:CCC, 222Dh:CCC, 222Ea:CCC, 222Eb:CCP, 222Em:CCP, 222Fa:CCC, 222Fb:CCC, 222Fc:CCC, 222Fd:CCC, 222Fe:CCC, 222Ga:CCC, 222Ha:CCC, 222Hb:CCC, 222Hc:CCC, 222Id:CPP, 222Ja:CCP, 222Jb:CCC, 222Jc:CCC, 222Jg:CCC, 222Ke:CCC, 222Kf:CCC, 222Kg:CCC, 222Lb:CCC, 222Lc:CCC, 222Ld:CCC, 222Le:CCC, 222M:CP, 231Al:CPP, 251Cb:CCC, 251Cc:CCC, 251Cd:CC?, 251Ce:CCC, 251Cf:CCC, 251Cg:CCC, 251Ci:CCC, 251Cj:CCC, 251Dc:CCC, 251De:CCC, 251Dg:CCC, M212Ac:CC?, M212Ad:CC?, M212Ae:CCC, M212Ba:CCC, M212Bb:CCP, M212Ca:CCC, M212Cb:CCP, M212Cc:CCP, M212Cd:CCP, M212Ea:C??, M212Eb:C??, M221Aa:CCC, M221Ab:CCC, M221Ac:CCC, M221Ad:CCC, M221Ba:CCC, M221Bb:CCC, M221Bc:CCC, M221Bd:CCP, M221Be:CCP, M221Bf:CCC, M221Ca:CP?, M221Cb:CP?, M221Cd:CPP, M221Da:CCP

Synonymy: Mixed Mesophytic Forest, in part (Foti 1994b); Deep soil mesophytic forest, in part (Evans 1991); Calcareous mesophytic forest, in part (Evans 1991); *Acer saccharum* forest series (Hoagland 1997); TIB4aII3a. *Acer saccharum-Quercus spp. (alba, rubra)-Carya spp. (ovata, tomentosa, cordiformis)* (Foti et al. 1994); Northern Red Oak: 55 (Eyre 1980); Mesic Limestone/Dolomite Forest, Dry-Mesic Bottomland Forest, Mesic Bottomland Forest (Nelson 1985)

References: Crow 1988, Evans 1991, Eyre 1980, Faber-Langendoen et al. 1996, Foti 1994b, Foti et al. 1994, Hoagland 1997, Nelson 1985, Nowacki et al. 1990, Steyermark 1940

Authors: MCS, MOD., KP, MCS **Identifier:** A.251

QUERCUS RUBRA—ACER SACCHARUM—FAGUS GRANDIFOLIA / VIBURNUM ACERIFOLIUM FOREST
Northern Red Oak—Sugar Maple—American Beech / Mapleleaf Viburnum Forest
[Red Oak—Northern Hardwood Forest] **G?**
S? 01-08-15

State Estimated EO's: ?—Not yet ranked.
State Area: U

Concept: Mesic oak forest of slightly acidic soils of intermediate fertility; lacking abundant ericads, occurring on well-drained loams on mid-slopes and coves. Differential species: *Corylus cornuta, Acer pensylvanicum*.

Comments:

Range:

Other States/Provinces: CT:S?, MA:S?, ME:S?, NH:S?, NY:S?, RI?, VT:S?

Physiographic Province, Section, Subsection: 212Bb:CCC, 212Ca:CPP, 212Da:CCC, 212Dc:CCC, 212Fb:CPP, 221Ak:CCC, **221B:**CC, **221D:**CC, 221E:C?, 221F:CP, 222Id:PPP, M212Ae:CCC, M212Ba:CCC, M212Ca:CCC, M212Cd:CCP, M212E:C?

Synonymy:

References:

Authors: ECS **Confidence:** 2 **Identifier:** CEGL006173

QUERCUS RUBRA—ACER SACCHARUM—LIRIODENDRON TULIPIFERA FOREST
Northern Red Oak—Sugar Maple—Tuliptree Forest
[High Allegheny Rich Red Oak—Sugar Maple Forest] **G?** 97-12-31
S3S4 01-08-15

State Estimated EO's: CD—Estimate between 75–200 occurrences. Not clear if this description fits New Jersey's examples. May need to reclassify for New Jersey.

State Area: C—Between 1,000–10,000 acres in state. Patch sizes probably range from 10–500 acres.

Concept: This red oak - sugar maple community is found primarily in the Allegheny Plateau and Appalachian Mountain regions of the United States, with possible extensions east and west of those areas. It is typically found in coves, on moist north- and east-facing slopes and on well-drained flats. Soils are slightly acid and of intermediate fertility. Stands contain a closed-canopy tree layer. *Acer saccharum, Liriodendron tulipifera, Quercus alba*, and *Quercus rubra* are the leading dominants. *Acer rubrum, Carya ovata, Carya alba (= Carya tomentosa), Nyssa sylvatica, Quercus coccinea, Quercus prinus*, and *Quercus velutina* are possible associates. A wide variety of more mesic associates, such as *Betula alleghaniensis, Betula lenta, Fagus grandifolia* and *Fraxinus americana* could occur but are negligible in dominance. In addition to *Acer saccharum* reproduction, some understory species may include *Carpinus caroliniana, Cercis canadensis*, and *Ostrya virginiana*. Shrub and vine species include *Amelanchier laevis, Amelanchier arborea, Cornus* spp., *Hamamelis virginiana, Lindera benzoin, Viburnum acerifolium, Viburnum recognitum*, and *Vitis riparia*. Ericaceous shrubs, such as *Kalmia latifolia, Vaccinium angustifolium* and *Vaccinium pallidum*, may also be present. The ground layer species are highly variable but include *Caulophyllum thalictroides, Dennstaedtia punctilobula, Podophyllum peltatum, Maianthemum racemosum (= Smilacina racemosa), Medeola virginiana, Thelypteris noveboracensis*, and *Uvularia sessilifolia*. Some additional herbs which are constant or abundant in Virginia stands include *Ageratina altissima, Bromus pubescens, Actaea racemosa (= Cimicifuga racemosa), Galium circaezans, Galium triflorum*, and *Polystichum acrostichoides*.

Comments: Possible differential species include *Liriodendron tulipifera* and *Magnolia tripetala*, though the latter species would restrict the type's concept. Fleming (1999) notes that (in Virginia examples) *Liriodendron* is "inconstant in mature stands, absent above 975 meters (3200 feet), and dominant only in heavily disturbed, successional stands. According to Anderson (1982) in Ohio, where this community is found in the southeastern unglaciated plateau region, it is differentiated from the oak-maple type, *Quercus alba—Quercus rubra—Quercus prinus—Acer saccharum / Lindera benzoin* Forest (CEGL002059), and the Appalachian oak forest type, *Quercus prinus—Quercus (alba, coccinea, velutina) / Viburnum acerifolium—(Kalmia latifolia)* Forest (CEGL005023), by the substantial presence (over 20% canopy or basal area) of *Liriodendron tulipifera* and insignificant amounts of *Fagus grandifolia* or other mesic tree species. This type concept may overlap considerably with that of the oak-maple type, *Quercus alba—Quercus rubra—Quercus prinus—Acer saccharum / Lindera benzoin* Forest (CEGL002059). Braun (1950, e.g., p. 140) reports stands similar to this type in the Shawnee Hills and Mammoth Cave area of Kentucky, as well as other Interior Low Plateau sites. In New York, this type is reported primarily from the southeastern part of the State (Reschke 1990).

Range: This red oak—sugar maple community is found primarily in the Allegheny Plateau and Appalachian Mountain regions of the United States, with possible extensions east and west of those areas, ranging from southeastern New York and New Jersey, south to Virginia and west to Pennsylvania, West Virginia, and southeast Ohio.

Other States/Provinces: NY:S?, OH:S?, PA:S?, VA:S?, WV?

Physiographic Province, Section, Subsection: 212F:CC, 212G:CC, **221D:**CC, 221Ea:CCC, 221Ec:CCC, 221Ed:CCC, 221Ee:CCP, 221Ef:CCC, 221F:CC, 221He:CCC, M221Aa:CCC, M221Ab:CCC, M221Ac:CCC, M221Ad:CCC, M221Ba:CCC, M221Bb:CCC, M221Bc:CCC, M221Bd:CC?, M221Be:CC?, M221Bf:CCC, M221C:C?, M221Da:CCP

Synonymy: *Acer saccharum var. saccharum—Quercus rubra—Carya (glabra, ovata) / Ageratina altissima* Forest (3.3) (Fleming 1999), Dry-mesic Calcareous Forest (Fleming 1999), Oak-maple-beech-tuliptree mesic forests (matrix) (CAP) (Fleming 1999)

References: Anderson 1982, Braun 1950, Fike 1999, Fleming 1999, Reschke 1990

Authors: D. Faber-Langendoen, ECS **Confidence:** 2 **Identifier:** CEGL006125

I.B.2.N.a.100. QUERCUS VELUTINA—QUERCUS ALBA—(QUERCUS COCCINEA) FOREST ALLIANCE

Black Oak—White Oak—(Scarlet Oak) Forest Alliance

Concept: Forests in this alliance represent the drier end of the white oak—red oak—black oak cover type and are difficult to identify easily. This alliance is distributed in the Ozark Highlands, Ouachita Mountains, Arkansas Valley, the Interior Highlands, Piedmont, and Blue Ridge, codominated by *Quercus alba* with *Quercus coccinea, Quercus velutina*, and *Quercus rubra*. *Quercus stellata, Quercus prinus, Carya alba, Carya glabra, Carya ovata, Pinus virginiana*, and *Pinus echinata* are common associates. Other common associates can include *Nyssa sylvatica, Acer rubrum var. rubrum, Sassafras albidum, Quercus falcata, Quercus macrocarpa* (within its range), and *Prunus serotina var. serotina*. Typical shrubs and small trees include *Cornus florida, Corylus americana, Ostrya virginiana, Oxydendrum arboreum, Sassafras albidum, Kalmia latifolia, Rhododendron calendulaceum, Gaylussacia ursina, Vaccinium* spp., *Viburnum acerifolium*, and *Hamamelis virginiana*. Common herbs include *Agrimonia rostellata, Amphicarpaea bracteata, Botrychium virginianum, Carex blanda, Danthonia spicata, Antennaria plantaginifolia, Desmodium nudiflorum, Thelypteris noveboracensis, Prenanthes altissima, Galium* spp., *Dioscorea villosa, Conopholis americana, Polygonatum biflorum, Medeola virginiana*, and *Maianthemum racemosum*. Stands can be found on mid to upper slopes and terraces where dry-mesic conditions persist and where soils are more sandy and/or rocky. Bedrock is sandstone, siltstone, chert, or shale. Disturbance in the form of wind and logging tends to favor *Quercus velutina* in these forests. These forests generally occur on slopes and sheltered ridgetops. One example from the Interior Low Plateau of Tennessee occurs on elevated terraces adjacent to river floodplains.

Comments: A new association will be added from the Arkansas Field Office Ouachita Inventory. This alliance is also present in Virginia, at least in the Ridge and Valley; a new association is likely needed. Stands previously placed in this alliance that occur in what are called inland maritime situations in older mature stands in the Outer Coastal Plain of South Carolina (C. Aulbach-Smith pers. comm.) need to be accommodated elsewhere. In Kentucky, these forests lack *Quercus rubra* as a dominant and occur in the Shawnee Hills and on upper slopes and ridgetops in the Appalachian Plateaus, and are abundant in the Interior Low Plateau.

Range: This alliance is distributed in the Ozark Highlands, Ouachita Mountains, Arkansas Valley, the Interior Highlands, Piedmont, and Blue Ridge. It is found in Arkansas, Georgia, North Carolina, South Carolina, Tennessee, Connecticut, Massachusetts, Maryland, Maine, New Hampshire, New Jersey, Pennsylvania, Rhode Island, Virginia, West Virginia, Iowa, Illinois, Indiana, Michigan, Minnesota, Missouri, Ohio, and Wisconsin, and in Ontario, Canada, and possibly in Alabama (?), Kentucky (?), Mississippi (?), and Oklahoma (?).

Other States/Provinces: AL? AR CT DE IA IL IN KY? MA MD MI MN MO MS? NC NH NJ NY OH ON PA RI SC? TN VA WI WV

Physiographic Province, Section, Subsection: 212F:CP, 212G:CP, 212Ht:CPP, 212Hu:CPP, 212Hw:CP?, 212Hx:CPP, 221Ab:CCP, 221Ac:CCP, 221Ad:CCP, **221Ae:**CCC, 221Af:CCC, 221Ag:CCC, 221Ai:CCP, 221Ak:CCC, **221Dc:**CPP, 221E:CP, 221F:CP, 221Jb:CCC, 222Aa:CCC, 222Ab:CCP, 222Ad:CCP, 222Ae:CCP, 222Af:CCP, 222Ag:CCP, 222Aj:CCP, 222Am:CCP, 222Ca:CCC, 222Cf:CCP, 222Cg:CCP, 222De:CCC, 222Df:CCC, 222Dh:CCP, 222Di:CCP, 222Eb:CCC, 222Eg:CCP, 222Eh:CCP, 222Ek:CCC, 222Em:CCC, 222Fe:CCC, 222Ga:CCC, 222Gb:CCC, 222Gd:CCC, 222Ha:CCC, 222Hb:CCP, 222Hf:CCP, 222Ig:CCC, 222Ja:CC?, 222Jb:CCP, 222Jg:CCC, 222Jh:CCC, 222Ji:CCC, 222Jj:CCC, 222Kf:CCC, 222Kg:CCP, 222Kj:CCC, 222Lc:CCC, 222Lf:CCC, 222Md:CCC, 222Me:CCC, 231A:CP, 231Gb:CCC, 232Aa:CCC, **232Ab:**CCC, **232Ac:**CCC, 232Ad:CCP, 232Br:CCC, 232Bt:CCP,

251Cf:CCC, 251Ci:CCC, 251Cj:CCC, 251Ck:CCC, 251Dc:CCC, 251Dd:CCC, 251Df:CCC, 251Dg:CCC, 251Dh:CCP, M221Aa:CCC, M221Ac:CCC, M221Bb:CCC, M221Bf:CCC, M221C:CP, M221Dc:CCC, M221Dd:CCP

Synonymy: Submesic Oak—Hickory Forest (Foti 1994b); Acidic sub-xeric forest, in part (Evans 1991); Montane Oak—Hickory Forest, in part (Schafale and Weakley 1990); TIB4aII4c. *Quercus alba—Quercus velutina—Quercus falcata* (Foti et al. 1994); White Oak—Black Oak—Northern Red Oak: 52, in part (Eyre 1980)

References: C. Aulbach-Smith pers. comm., Evans 1991, Eyre 1980, Faber-Langendoen et al. 1996, Foti 1994b, Foti et al. 1994, Jones 1988a, Jones 1988b, Schafale and Weakley 1990

Authors: D. FABER-LANGENDOEN/L.A. , MP, SCS **Identifier:** A.1911

QUERCUS COCCINEA—QUERCUS VELUTINA / SASSAFRAS ALBIDUM / VACCINIUM PALLIDUM FOREST
Scarlet Oak—Black Oak / Sassafras / Hillside Blueberry Forest
[Coastal Oak—Heath Forest] **G?**
S1S3 01-08-15

State Estimated EO's: A
State Area: C

Concept: This dry oak forest of New England and northeastern Coastal Plain occurs on rapidly drained, nutrient-poor, sandy or gravelly soils. North of the glacial border, these soils are typically found on till or outwash. The canopy is characterized by *Quercus coccinea, Quercus velutina*, and *Quercus alba*, the latter species particularly characteristic of gravel substrates. Other less abundant canopy associates include *Quercus prinus, Betula lenta* and *Ilex opaca* (usually less than 15% cover). *Pinus rigida* is a common associate but occurs at low cover. *Sassafras albidum* may occur in low cover and may indicate influence by coastal (but not maritime) climate where this type occurs in coastal regions. A 'lawn-like' dwarf-shrub heath layer dominated by *Vaccinium pallidum, Vaccinium angustifolium* and *Gaylussacia baccata* is characteristic. *Gaylussacia frondosa* also occurs in some stands. The herbaceous layer is typically sparse, with *Carex pensylvanica, Pteridium aquilinum, Gaultheria procumbens* being the most common associates. Herb diversity is greater in small canopy gaps, where *Helianthemum canadense, Lespedeza* spp., *Lechea* spp., and *Arctostaphylos uva-ursi* occur.

Comments:

Range:

Other States/Provinces: CT:S?, MA:S?, NH:S?, NY:S?, RI:S?

Physiographic Province, Section, Subsection: 221Ab:CCP, 221Ac:CCP, 221Ad:CCP, **221Ae:**CCP, 221Af:CCC, 221Ag:CCC, 221Ai:CCP, 221Ak:CCC, **221Dc:**CPP, 232Aa:CCC, **232Ab:**CCC

Synonymy:

References: Breden 1989, Metzler and Barrett 1996, Reschke 1990, Sperduto 1996

Authors: ECS **Confidence:** 2 **Identifier:** CEGL006375

QUERCUS VELUTINA—QUERCUS COCCINEA—QUERCUS PRINUS / KALMIA LATIFOLIA FOREST
Black Oak—Scarlet Oak—Rock Chestnut Oak / Mountain Laurel Forest
[Coastal Oak / Laurel Forest] **G?**
S3 01-08-16

State Estimated EO's: C—Estimated 21–100 occurrences.
State Area: C—Estimated 1,000–10,000 acres in state. Patch size ranges from 10–1,000 acres.

Concept: This large-patch coastal oak forest occurs on convex slopes on sandy and gravelly soils. Characteristic dominants are *Quercus coccinea, Quercus velutina, Quercus prinus, Quercus alba*. Pines (*Pinus rigida*, as well as *Pinus echinata* in New Jersey, or *Pinus*

virginiana) may be present at low cover. *Kalmia latifolia* is the dominant shrub, with other ericaceous shrubs such as *Vaccinium pallidum* and *Gaylussacia baccata* contributing significant cover. The herbaceous layer is sparse and may include *Pteridium aquilinum, Gaultheria procumbens, Carex pensylvanica, Carex albicans*.

Comments:

Range:

Other States/Provinces: DE:S?, MD:S?, NY:S?, VA:S?

Physiographic Province, Section, Subsection: 221Ae:CCC, **221Dc:**CPP, 232Aa:CCC, **232Ab:**CCC, **232Ac:**CCC, 232Ad:CCP, 232Br:CCC, 232Bt:CCP

Synonymy: Mixed oak—mt. laurel—azalea—heath mesic forest (Windisch 1995b). at Fort Dix

References: Hunt 1997, Windisch 1995b

Authors: ECS **Confidence:** 2 **Identifier:** CEGL006374

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

I.B.2.N.d.27. ACER SACCHARUM—CARYA CORDIFORMIS TEMPORARILY FLOODED FOREST ALLIANCE

Sugar Maple—Bitternut Hickory Temporarily Flooded Forest Alliance

Concept: Forests in this alliance are dominated by *Acer saccharum* and *Carya cordiformis*. The subcanopy may contain a variety of species including *Ulmus americana, Ulmus rubra, Morus rubra*, and *Prunus serotina var. serotina*. The shrub layer is often quite dense with *Asimina triloba, Toxicodendron radicans*, and *Vitis* spp. dominating, but *Lindera benzoin, Aralia spinosa, Corylus americana*, and *Cornus florida* are also common. Where dense shrubs exist, light penetrating to the forest floor is diminished, and herbaceous density is reduced. *Campanulastrum americanum* and *Fleischmannia incarnata (= Eupatorium incarnatum)* are common herbs. Stands of this alliance occur on level to gently sloping ridges, terraces, natural levees, or higher elevations which border river floodplains or streams. They are found on moist, well-drained to moderately drained soils, primarily on northern aspects. In general, soils are medium-textured silt and colluvial, deep, clay loams derived mainly from sandstone and shales. Mesic moisture conditions are maintained throughout most of the growing season, but some flooding does occur. Damage from flooding during periods of heavy precipitation, wind, or storms can have dramatic effects on species composition. Although stands in this alliance tend to be late successional floodplain forest, the stresses of seasonal flooding create canopy openings which are quickly colonized by early and mid-successional species.

Comments:

Range: This alliance is found in southern Illinois, southern Indiana, Kentucky, Tennessee, West Virginia, Virginia, Maryland, Pennsylvania, New Jersey, New York, Connecticut, New Hampshire, Massachusetts, Vermont, and Maine.

Other States/Provinces: AR CT IL IN? KY MA MD ME MO NH NJ NY OH? OK TN VT

Physiographic Province, Section, Subsection: 212Aa:CPP, 212Ab:CPP, 212Ba:CCC, 212Bb:CCC, 212Ca:CPP, 212Cb:CPP, 212Da:CCC, 212Dc:CCP, 212Ea:CPP, 212Eb:CPP, 212Ec:CPP, 212Ed:CP?, 212Fa:CPP, 212Fb:CPP, 212Fc:CPP, 212Ga:CPP, 212Gb:CPP, 221Aa:CC?, 221Ad:CCP, **221Ae:**CCP, 221Af:CCP, 221Ag:CCP, 221Ah:CC?, 221Ai:CCP, 221Aj:CC?, 221Ak:CCC, 221Al:CCP, **221Ba:**CPP, 221Bb:CPP, 221Bc:CPP, **221Bd:**CPP, 221Db:CPP, 221Ea:CPP, 221Eb:CPP, 221Fa:CPP, 222Aa:CCC, 222Af:CCC, 222Ag:CCC, 222Aj:CCP, 222Ak:CCP, 222Al:CCC, 222An:CCC, 222Ao:CCP, 222Aq:CCP, 222Ca:CP?, 222Cb:CP?, 222Ch:CP?, 222Dh:CCC, 222Di:CCC, 222Gb:CCC, 222Hb:CCC, 222Ia:CPP, 222Ib:CPP, 222Ic:CPP, 222Id:CPP, 222Ie:CPP, 222If:CPP, 231Ae:PPP, 231Ak:PPP, 231Al:PPP, 231An:PPP, 231Ap:PPP, 232Ad:PPP, 232Br:PPP, 251Cj:CCC, M212Ac:CCP, M212Ad:CCP, M212Ae:CCC, M212Af:CCC, M212Ag:CCC, M212Ba:CCC, M212Bb:CCP,

M212Ca:CCC, M212Cc:CCP, M212Cd:CCC, M212Da:CPP, M212Db:CPP, M212Dc:CPP, M212Ea:CP?, M212Eb:CPP, M212Fa:CP?, M212Fb:CPP, M221Aa:PPP, M221Ab:PPP, M221Bb:PPP, M221Bd:PPP, M221Be:PPP, M221Bf:PP?, M221Ca:PPP, M221Cb:PPP, M221Cd:PP?, M221Da:P??, M222:C, M231Aa:CCC, M231Ab:CCC, M231Ac:CCC

Synonymy: Sugar Maple: 27, in part (Eyre 1980)

References: Eyre 1980, Faber-Langendoen et al. 1996, Nelson 1985, Steyermark 1940

Authors: D.J. ALLARD/D. FABER-LANG, MP, ECS **Identifier:** A.302

ACER SACCHARUM—FRAXINUS SPP.—TILIA AMERICANA / MATTEUCCIA STRUTHIOPTERIS—AGERATINA ALTISSIMA FOREST

Sugar Maple—Ash species—American Basswood / Ostrich Fern—White Snakeroot Forest [High Terrace Floodplain Forest] **G?**

S2S3 01-08-15

State Estimated EO's: C

State Area: B—Estimate between 100-5,000 acres in state. Patch size probably ranges from 5–50 acres.

Concept: High-terrace, rich floodplain forest of glaciated Northeast. 6/98 NAP Forests of coarse alluvial soils on slightly higher terraces from the riverbank. Less regular flooding but can be close to river. Closed to somewhat open canopy of *Acer saccharum, Tilia americana, Ulmus americana, Fraxinus americana, Carpinus caroliniana, Prunus serotina*. Other associates include *Juglans cinerea, Fraxinus nigra, Acer rubrum, Quercus rubra*, and *Prunus virginiana*. Understory is dominated by *Matteuccia struthiopteris*, vines such as *Parthenocissus quinquefolia*, or *Vitis rupestris* and a mixture of herbaceous annuals and perennials. Characteristic species include *Ageratina altissima (= Eupatorium rugosum), Elymus virginicus, Elymus riparius, Elymus wiegandii (= Elymus canadensis var. wiegandii), Osmunda claytoniana, Carex gracillima, Carex intumescens, Solidago flexicaulis, Solidago rugosa, Solidago gigantea*. Exotic species, such as *Lysimachia nummularia, Glechoma hederacea*, and *Hesperis matronalis*. Coarse alluvial soils which are less regularly inundated than the soils supporting silver maple types. The setting is often a slightly raised river terrace. This forest, however, may occur very close to the riverbank if the water channel is well entrenched. Many of our examples occur on slightly calcareous soils.

Comments:

Range:

Other States/Provinces: CT:S?, MA:S?, MD:S?, ME:S?, NH:S?, NY:S?, VT:S?

Physiographic Province, Section, Subsection: 212Aa:CPP, 212Ab:CPP, 212Ba:CCC, 212Bb:CCC, 212Ca:CPP, 212Da:CCC, 221Ak:CCC, **221B:**C?, **221D:**C?, M212Ae:CCC, M212Af:CCC, M212Ag:CCC, M212Ba:CCC, M212Ca:CCC, M212Cd:CCC

Synonymy: Riverine floodplain forest: terraces (NAP)

References: Breden 1989, Reschke 1990, Sperduto 1997b

Authors: ECS **Confidence:** 2 **Identifier:** CEGL006114

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

I.B.2.N.e.1. ACER RUBRUM—FRAXINUS PENNSYLVANICA SEASONALLY FLOODED FOREST ALLIANCE

Red Maple—Green Ash Seasonally Flooded Forest Alliance

Concept: 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.

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.

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.

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

Physiographic Province, Section, Subsection: 212Cb:CCC, 212Da:C??, 212Ea:CP?, 212Eb:CPP, 212Ec:CPP, 212Fa:CPP, 212Fb:CPP, 212Fc:CPP, 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:**CCP, 221Bb:CC?, 221Bc:CCC, **221Da:**CCP, 221Db:CCP, **221Dc:**CCP, 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:CPP, 231Ae:CPP, 231Af:CPP, 231Ak:CPP, 231Al:CPP, 231Am:CPP, 231An:CPP, 231Ao:CPP, 231Ap:CPP, 231Gc:CCC, 231Ge:CCC, 232Aa:CCP, 232Ad:CC?, 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:CCP, 232Bs:CCC, 232Bt:CC?, 232Bu:CC?, 232Bv:CC?, 232Bx:CC?, 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:CPP, M212Ca:CP?, M212Cd:CP?, M212D:CP,

M221Aa:CCP, M221Ab:CCC, M221Bb:CCP, M221Bd:CCP, M221Be:CCC, M221Ca:CP?, M221Cb:CPP, M221Da:CCP, M221Dc:CCC, M222A:??, M231A:??

Synonymy: *Acer rubrum—Liquidambar styraciflua* forest association (Hoagland 1997); *Acer rubrum—Nyssa aquatica* forest (Robertson et al. 1984); ? Red maple-green ash (Wharton et al. 1982); No equivalent (Eyre 1980)

References: Faber-Langendoen et al. 1996, Golet et al. 1993, Hoagland 1997, Robertson et al. 1984, Wharton et al. 1982

Authors: ECS, MP, MCS **Identifier:** A.316

ACER RUBRUM—FRAXINUS (PENNSYLVANICA, AMERICANA) / LINDERA BENZOIN / SYMPLOCARPUS FOETIDUS FOREST

Red Maple—(Green Ash, White Ash) / Northern Spicebush / Skunk-cabbage Forest

[Red Maple Swamp] **G4G5** 98-06-25

S3S5 01-08-15

State Estimated EO's: C—Estimate 50–250 occurrences.

State Area: B—Estimate 500–3,000 acres in state. Patch sizes probably range from 5–50 acres.

Concept: Seasonally flooded red maple swamp influenced by overland flow as well as groundwater seepage. In general, these swamps are acidic and have some seepage indicators, but are not particularly species rich. They may occur on slightly sloping hillsides, along small streams, or in basins that receive overland flooding in addition to groundwater influence. Soils are shallow to moderately deep mucks over mineral soils. *Acer rubrum* dominates the canopy; *Fraxinus pennsylvanica* or *Fraxinus americana* are usually also found in the canopy. *Fraxinus nigra* is not generally associated with this type, and if present occurs only as scattered individuals. The shrub layer may be fairly open to quite dense, depending on the amount of canopy closure. Shrubs include *Vaccinium corymbosum, Rhododendron viscosum, Clethra alnifolia, Lindera benzoin*, and *Ilex verticillata*. The herbs *Symplocarpus foetidus* and *Osmunda cinnamomea* are nearly always present. Other herbaceous species are *Impatiens capensis, Carex stricta, Veratrum viride, Osmunda regalis, Onoclea sensibilis*. *Sphagnum* mosses are common on hummocks, but do not in general form extensive carpets.

Comments:

Range:

Other States/Provinces: CT:S?, DE:S?, MA:S?, MD:S?, ME:S?, NH:S?, NY:S?, RI:S?

Physiographic Province, Section, Subsection: 221Ab:CCC, 221Ac:CCC, 221Ad:CCC, **221Ae:**CCC, 221Af:CCC, 221Ag:CCC, 221Ai:CCC, 221Ak:CCC, 221Al:CCC, **221Da:**CCP, **221Dc:**CCP, 232Aa:CCP

Synonymy:

References: Breden 1989, Enser 1993, Golet et al. 1993, Maine Natural Heritage Program (MENHP) 1991, Metzler and Barrett 1996, Reschke 1990

Authors: ECS **Confidence:** 1 **Identifier:** CEGL006406

ACER RUBRUM—FRAXINUS PENNSYLVANICA / SAURURUS CERNUUS FOREST

Red Maple—Green Ash / Lizard's-tail Forest

[Red Maple Swamp] **G?** 00-03-21

S? 01-08-15

State Estimated EO's: —Not yet ranked in New Jersey.

State Area: U

Concept: This red maple swamp community of the Coastal Plain of the Chesapeake Bay region occurs on poorly drained to very poorly drained soils that are seasonally to semipermanently flooded. A thin organic horizon overlies sandy or silt clay loam soils.

The tree canopy is closed to partially open and dominated by *Acer rubrum, Fraxinus pennsylvanica, Fraxinus profunda*, and *Quercus lyrata*. Associated canopy species may include *Nyssa sylvatica, Quercus phellos*, and *Populus heterophylla*. The shrub layer includes *Lindera benzoin, Leucothoe racemosa, Ilex verticillata*, and *Viburnum* spp. The herbaceous layer is characterized by *Saururus cernuus, Peltandra virginica, Boehmeria cylindrica, Triadenum walteri, Cinna arundinacea, Pilea pumila*, and *Polygonum arifolium*.

Comments:
Range:
Other States/Provinces: DE:S?, MD:S?, VA?
Physiographic Province, Section, Subsection: 232:C
Synonymy:
References: Bowman 2000, Meininger 1998, Thompson et al. 1999
Authors: ECS **Confidence:** 1 **Identifier:** CEGL006606

I.B.2.N.e.6. LIQUIDAMBAR STYRACIFLUA—(ACER RUBRUM) SEASONALLY FLOODED FOREST ALLIANCE

Sweetgum—(Red Maple) Seasonally Flooded Forest Alliance

Concept: Forests dominated by *Liquidambar styraciflua* with seasonally flooded hydrology. Some stands may be dominated or codominated by *Acer rubrum*. Other woody species that may be present include *Planera aquatica, Salix nigra, Quercus palustris, Quercus lyrata, Fraxinus pennsylvanica, Quercus phellos*, and *Cornus foemina*. Shrubs that may be present include *Ilex opaca, Magnolia virginiana, Cephalanthus occidentalis, Clethra alnifolia, Leucothoe racemosa*, and *Vaccinium corymbosum*. *Sphagnum* spp. are common in the herbaceous layer. Known examples occur in seasonally flooded depressions and not on floodplains.

Comments: There is a *Liquidambar styraciflua*-dominated type in ponded areas and shallow sloughs in Pond Creek Bottoms in southwestern Arkansas, Sevier and Little River counties (J. Campbell pers. comm., D. Zollner pers. comm. cited in Weakley et al. 1996). Other woody species include *Salix nigra, Planera aquatica, Quercus lyrata, Cephalanthus occidentalis, Cornus foemina, Styrax americanus, Brunnichia ovata*, and *Cardiospermum halicacabum*. Herbs include *Carex joorii, Cyperus erythrorhizos, Hydrocotyle verticillata, Triadenum walteri, Limnobium spongia, Lycopus rubellus, Mikania scandens, Polygonum hydropiperoides, Proserpinaca palustris, Rhynchospora corniculata*, and *Saururus cernuus*. See *Liquidambar styraciflua—(Acer rubrum)* Seasonally Flooded Forest [Placeholder] (CEGL007387).

Range: This alliance is found in Alabama, Arkansas, Georgia, North Carolina, Tennessee, Delaware, Maryland, New Jersey, New York, Pennsylvania (?), Virginia, West Virginia, and elsewhere.

Other States/Provinces: AL AR DE GA MD NC NJ NY PA? SC TN VA WV

Physiographic Province, Section, Subsection: 221D:??, 221E:??, 221F:??, 231Ad:CCC, 231Af:CCC, 231Cd:CCC, 231E:CC, 231Ga:CC?, 231Gb:CC?, 231Gc:CC?, 232Aa:CCC, **232Ab:**CCC, **232Ac:**CCC, 232Bj:CCC, 232Bq:CCC, 232Bt:CCC, 232Cb:CCC, 232Ce:CCC, 232F:CC, 234Ac:PPP, 234An:PPP, 255A:PP, M221B:C?, M221C:C?, M221Dd:CCC

Synonymy: No equivalent (Eyre 1980)

References: Campbell et al. 1996, Weakley et al. 1996

Authors: A.S. WEAKLEY/K.D. PATTERS, MP, SCS **Identifier:** A.321

LIQUIDAMBAR STYRACIFLUA—ACER RUBRUM—QUERCUS PHELLOS / LEUCOTHOE RACEMOSA FOREST
Sweetgum—Red Maple—Willow Oak / Swamp Doghobble Forest
[Red Maple—Sweetgum Swamp] **G?**
S3 01-08-15

State Estimated EO's: C—Estimate 40–100 occurrences.
State Area: C—Estimate 1,000–10,000 acres in state. Patch sizes probably range from 5–250 acres.

Concept: This association is a seasonally flooded forest of shallow basins and other depressions of the Coastal Plain of the Chesapeake Bay region. The substrate is characterized by mineral soils, generally acidic, gleyed to mottled, sandy or clay loams. Characteristic tree species include *Acer rubrum, Liquidambar styraciflua*, and *Nyssa sylvatica*, which are nearly constant in the canopy. Associates include *Ilex opaca, Magnolia virginiana, Sassafras albidum, Quercus palustris, Pinus taeda*, and *Quercus phellos*. The shrub layer is characterized by *Leucothoe racemosa, Vaccinium corymbosum, Clethra alnifolia*, and *Rhododendron viscosum*. *Smilax rotundifolia* is a particularly characteristic vine. The herbaceous layer is generally sparse but may include *Mitchella repens, Osmunda cinnamomea, Woodwardia areolata, Onoclea sensibilis*, and *Polygonum* spp.
Comments: Delaware examples contain *Quercus* spp. and *Magnolia virginiana*. In Maryland, *Clethra* is more prominent than *Leucothoe, Quercus phellos* less characteristic than *Nyssa sylvatica*.
Range:
Other States/Provinces: DE:S?, MD:S?, NY:S1S2, PA?, VA:S?
Physiographic Province, Section, Subsection: 221D:??, 231A:??, 232Aa:CCC, **232Ab:**CCC, **232Ac:**CCC, 232Bt:CCC, 232C:CC
Synonymy: *Leucothoe racemosa* communities (Tyndall et al. 1990). are likely synonymous with this community
References: Breden 1989, Clancy 1996, Hunt 1998, Sneddon and Anderson 1994, Sneddon et al. 1996, Tyndall et al. 1990
Authors: ECS **Confidence:** 1 **Identifier:** CEGL006110

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

I.B.2.N.g.2. ACER RUBRUM—NYSSA SYLVATICA SATURATED FOREST ALLIANCE
Red Maple—Blackgum Saturated Forest Alliance

Concept: Forests in this alliance have variable canopy composition, but *Acer rubrum* and *Nyssa sylvatica* are common components. Canopy composition differs from the surrounding upland and varies with geography. Typical canopy species across the range of this alliance include *Acer rubrum var. trilobum, Nyssa sylvatica*, and *Liquidambar styraciflua*. Understory and shrub species include *Alnus serrulata, Ilex opaca var. opaca, Photinia pyrifolia (= Aronia arbutifolia)*, and *Ilex verticillata*. Characteristic herbaceous species are *Osmunda cinnamomea* and *Osmunda regalis*. *Sphagnum* spp. are typical. These wetland forests occur where surface water is seldom present, but the substrate is saturated to the surface for extended periods during the growing season, and include forested acid seeps on hillsides or streamheads, on edges of floodplains, and other poorly drained depressions. Individual occurrences of these forests tend to be small in extent, and can provide habitat for rare plant species.
Comments: This alliance may only cover a portion of the variation in wooded seeps in Arkansas, where a calcareous shale and a sandstone seep type need to be defined (D. Zollner pers. comm.).

Range: This alliance is known from the Cumberland Plateau of Alabama, Kentucky and Tennessee, the Allegheny Plateau of Kentucky, the upper East Gulf Coastal Plain of Kentucky and Tennessee, the Piedmont of North Carolina, South Carolina, and Virginia, the Arkansas River Valley, and the Coastal Plain of North Carolina, New Jersey, Pennsylvania, Delaware, Maryland, and Virginia. It may also be found in Georgia (?), Oklahoma, Connecticut, Massachusetts, Maine, New Hampshire, New York, Vermont, West Virginia, and Illinois (?).

Other States/Provinces: AL AR CT DE GA IL? KY LA MA MD ME NC NH NJ NY OK PA RI SC TN TX VA VT WV

Physiographic Province, Section, Subsection: 212Aa:CCP, 212Ab:CCP, 212Ba:CCP, 212Bb:CCP, 212Ca:CCP, 212Cb:CCP, 212Da:CCP, 212Db:CCP, 212Dc:CCP, 212Ec:CPP, 212Ed:CP?, 212Fa:CPP, 212Fb:CPP, 212Fc:CPP, 212Fd:CPP, 212Ga:CPP, 212Gb:CPP, 221Aa:CCP, 221Ab:CCP, 221Ac:CCC, 221Ad:CCC, **221Ae:**CCP, 221Af:CCP, 221Ag:CCP, 221Ah:CCP, 221Ai:CCP, 221Aj:CCP, 221Ak:CCP, 221Al:CCP, **221Am:**CCP, **221Ba:**CCP, 221Bb:CCP, 221Bc:CCP, **221Bd:**CCP, **221Da:**CPP, 221Db:CPP, **221Dc:**CPP, 221Ea:CCP, 221Eb:CCP, 221Fa:CPP, 221Fb:CPP, 221Hc:CCC, 221He:CCC, 222Ab:CCC, 222Ag:CCC, 222Ah:CCC, 222An:CCC, 222Ca:CC?, 222Cb:CCC, 222Ce:CCC, 222Cg:CCC, 222Dc:CCP, 222Dg:CCP, 222Eg:CC?, 222Eo:CCC, 222G:CC, 222Ia:CPP, 231Aa:CCC, 231Ad:CCC, 231Ae:CCP, 231Af:CCC, 231An:CCP, 231Ao:CCP, 231Bc:CCC, 231Ca:CCC, 231Cd:CCC, 231Dc:CCC, 231De:CCC, 231Ec:CCC, 231Ga:CCC, 231Gb:CCC, 231Gc:CCC, 232Aa:CCP, **232Ab:**CCC, **232Ac:**CCP, 232Ad:CCP, 232Ba:CCP, 232Bb:CCP, 232Bc:CCP, 232Bq:CCC, 232Br:CCP, 232Bz:CCC, 232Ch:CP?, M212Aa:CC?, M212Ab:CC?, M212Ac:CCP, M212Ad:CCP, M212Bb:CCP, M212Bd:CCC, M212Cc:CCP, M221Aa:CCC, M221Ab:CCC, M221Ac:CCC, M221Ad:CCC, M221Ba:CCP, M221Bb:CCP, M221Bc:CCC, M221Bd:CCP, M221Be:CCP, M221Bf:CCP, M221Ca:CP?, M221Cb:CPP, M221Da:CCP, M221Dd:CCC, M222Aa:CCC, M222Ab:CCC, M231Aa:CCC, M231Ab:CCC, M231Ac:CCC, M231Ad:CCC

Synonymy: IIA9a. Forested Mountain Seep, in part (Allard 1990); Wooded Seep, in part (Foti 1994b); Appalachian Acid Seep, in part (Evans 1991); Cretaceous Hills forested acid seep (Evans 1991); Low Elevation Seep (Schafale and Weakley 1990); Boggy Streamside Seep (M. Schafale pers. comm.)

References: Allard 1990, Breden 1989, Campbell 1989b, Evans 1991, Foti 1994b, Funk 1975, Funk and Fuller 1978, Harvill 1967, Heckscher 1994, M. Schafale pers. comm., Schafale and Weakley 1990

Authors: K.D. PATTERSON/J. CAMPBEL, KP, ECS **Identifier:** A.348

ACER RUBRUM—NYSSA SYLVATICA—LIQUIDAMBAR STYRACIFLUA—POPULUS HETEROPHYLLA FOREST
Red Maple—Blackgum—Sweetgum—Swamp Cottonwood Forest
[Cape May Lowland Swamp]

G1 97-11-18
S1 01-08-15

State Estimated EO's: A—Estimate less than 5 occurrences.
State Area: B—Estimate 500–1,000 acres in state. Patch sizes range from 40–400 acres.

Concept: Typically this community occupies the headwaters of streams where occurrences probably receive groundwater discharge. Topography is gently rolling with a series of wet depressions alternating with drier islands. Stands generally have high diversity, one occurrence was found to contain 20–25 species of trees and 40 species of shrubs. Typical canopy species include *Acer rubrum, Liquidambar styraciflua, Fraxinus profunda*, and *Nyssa sylvatica*. *Magnolia virginiana* and *Ilex opaca* are frequent subcanopy trees. Characteristic shrubs include *Clethra alnifolia, Rhododendron viscosum, Lindera benzoin*, and *Itea virginica*. In addition to these generally 'acid-loving' species a number of typical calcicoles occur in this community including *Cirsium muticum, Euphorbia*

purpurea, Platanthera flava var. flava. Several species with a more southern distribution are also found in this community including *Quercus michauxii, Quercus phellos, Quercus nigra, Triadenum walteri*, and *Populus heterophylla*.

Comments:
Range:
Other States/Provinces: MD?,
Physiographic Province, Section, Subsection: 232Ab:CCC
Synonymy:
References: Breden 1989
Authors: ECS **Confidence:** 2 **Identifier:** CEGL006013

ACER RUBRUM—NYSSA SYLVATICA—MAGNOLIA VIRGINIANA FOREST
Red Maple—Blackgum—Sweetbay Forest
[Southern Red Maple—Black Gum Swamp Forest] **G3?**
S4S5 01-08-15

State Estimated EO's: D—Estimate >100 occurrences in state.
State Area: D—Estimate 10,000–30,000 acres in state. Patch sizes probably range from 10–500 acres.

Concept: This acidic red maple swamp forest community of the eastern middle-latitude states is a nutrient-poor wetland forest occurring in poorly drained depressions. Soils are typically moderately deep to deep muck over mineral soil, with pools of standing water at the surface. Acidic waters originate from groundwater-fed seepage, with little to no overland seasonal flooding. This community is characterized by *Acer rubrum* and *Nyssa sylvatica* in the canopy, which may be quite open in some examples. Canopy associates include *Magnolia virginiana, Liquidambar styraciflua*, and *Persea palustris*. The shrub layer is characterized by *Vaccinium formosum*, as well as *Clethra alnifolia, Ilex verticillata, Ilex opaca*, and *Rhododendron viscosum*. The herbaceous layer is generally poorly developed and may include *Symplocarpus foetidus, Triadenum virginicum, Lythrum lineare, Osmunda regalis var. spectabilis, Woodwardia areolata*, and *Osmunda cinnamomea*. *Sphagnum* spp. and other mosses are common.

Comments:
Range:
Other States/Provinces: DE:S?, MD:S?, NY:S?, PA:S?, VA:S?
Physiographic Province, Section, Subsection: 232Aa:CCP, **232Ab:**CCC, **232Ac:**CC?, 232Bz:CCC, 232Ch:CP?
Synonymy: Cape May lowland swamp, in part (Breden 1989), Inland red maple swamp (Breden 1989), *Acer rubrum—Quercus nigra—Nyssa sylvatica* swamp (Harvill 1967), Broadleaf swamp forest (Heckscher 1994), Woodland fresh marsh community (Hill 1986)
References: Breden 1989, Ehrenfeld and Gulick 1981, Harvill 1967, Heckscher 1994, Hill 1986, McCormick 1979, Robichaud and Buell 1973, Sipple and Klockner 1984, Windisch 1995b
Authors: ECS **Confidence:** 2 **Identifier:** CEGL006238

ACER RUBRUM—NYSSA SYLVATICA / RHODODENDRON VISCOSUM—CLETHRA ALNIFOLIA FOREST
Red Maple—Blackgum / Swamp Azalea—Coastal Sweet-pepperbush Forest
[Lower New England Red Maple—Black Gum Swamp] **G?**
S4S5 01-08-15

State Estimated EO's: D—Estimate 100–1,000 occurrences.
State Area: D—Estimate 5,000–30,000 acres in state. Patch sizes probably 5–100 acres.

Concept: Red maple swamp of poorly drained depressions characterized by acidic, tannic water that does not receive substantial nutrient input from overland flow. Core of distribution is Lower New England / Northern Piedmont and North Atlantic Coast. *Acer rubrum, Nyssa sylvatica* are canopy dominants. The shrub layer is characterized by *Vaccinium corymbosum, Clethra alnifolia, Ilex verticillata, Rhododendron viscosum, Leucothoe racemosa*, and on the Atlantic Coastal Plain *Ilex glabra* may also be present. The herbaceous layer is not particularly diverse, characterized by *Osmunda cinnamomea, Symplocarpus foetidus, Carex intumescens, Osmunda regalis*, and *Onoclea sensibilis*. Hummock—hollow microtopography is evident, and *Sphagnum* mosses make up the bryophyte layer. This community is differentiated from *Acer rubrum—Nyssa sylvatica—Betula alleghaniensis / Sphagnum* spp. Forest (CEGL006014) by the absence or infrequent occurrence of *Tsuga canadensis, Betula alleghaniensis, Nemopanthus mucronatus, Carex trisperma, Clintonia borealis*, and by the presence of species with more southern affinities such as *Clethra alnifolia, Ilex glabra, Rhododendron viscosum*.
Comments:
Range:
Other States/Provinces: CT:S?, MA:S?, NY:S?, PA:S?, RI:S?
Physiographic Province, Section, Subsection: 221Ab:CCP, 221Ac:CCC, 221Ad:CCC, **221Ae:**CCP, 221Ag:CCP, 221Ak:CCP, **221B:**CC, **221Dc:**CPP, M212B:CC, M212C:CC
Synonymy:
References: Breden 1989, Golet et al. 1993, Metzler and Barrett 1996, Reschke 1990
Authors: ECS **Confidence:** 2 **Identifier:** CEGL006156

I.B.2.N.g.1. FRAXINUS NIGRA—ACER RUBRUM SATURATED FOREST ALLIANCE
Black Ash—Red Maple Saturated Forest Alliance

Concept: This alliance, found in the upper midwestern and eastern regions of the United States as well as parts of adjacent Canada, contains communities known as 'calcareous seepage swamps,' 'hardwood swamps,' and 'red maple—black ash swamps' in which *Acer rubrum* and *Fraxinus nigra* are dominant or prominent canopy members. Total canopy cover ranges from nearly closed to open. Where the tree canopy is open, the understory vegetation is patchy, ranging from shrub-dominated patches to minerotrophic sedge meadows. Associated canopy trees are *Betula alleghaniensis, Ulmus rubra, Ulmus americana*, and *Pinus strobus*. In the northern parts of the range, *Larix laricina, Thuja occidentalis*, and *Abies balsamea* are sometimes present. *Lindera benzoin* (east), *Toxicodendron vernix, Alnus incana* (north), *Salix* spp., and *Rhamnus alnifolia* often occur in the shrub layer. The herbaceous layer is often quite diverse, supporting such species as *Carex leptalea, Carex bromoides ssp. bromoides, Caltha palustris, Veratrum viride, Platanthera grandiflora, Geum rivale* (north), *Symplocarpus foetidus, Trollius laxus* (north), *Cypripedium reginae, Cypripedium parviflorum (= Cypripedium calceolus), Osmunda cinnamomea, Impatiens capensis, Cardamine bulbosa, Saxifraga pensylvanica, Dryopteris cristata*, and *Carex lacustris*.

Stands are typically found in poorly drained depressions (sometimes as narrow zones or small inclusions in wetland complexes, sometimes as large swamps), and occasionally in seepage zones at the base of river terraces or draws. Soils are generally muck and, although *Sphagnum* spp. may occur, there is generally not substantial peat development. Stands often occur in areas where there is influence by calcareous bedrock, and soil pH is generally higher than that of other alliances containing *Acer rubrum*.
Comments:
Range: This alliance is found in Connecticut, Maine, Massachusetts, Maryland, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, Virginia, West Virginia, Indiana, Illinois, Michigan, Minnesota, Missouri, North Dakota, and Wisconsin; and in Canada in Manitoba and Ontario. Present in Garrett County, Maryland.

Other States/Provinces: CT IL IN? MA MB MD MI MN MO ND NH NJ NY ON PA RI VA VT WI WV

Physiographic Province, Section, Subsection: 212Ea:CPP, 212Eb:CPP, 212Ec:CPP, 212Ed:CP?, 212Fa:CPP, 212Fb:CPP, 212Fc:CPP, 212Fd:CPP, 212Ga:CPP, 212Gb:CP?, 212Ha:CCP, 212Hb:CCP, 212Hd:CCC, 212He:CCP, 212Hh:CCP, 212Hi:CCP, 212Hj:CCP, 212Hk:CCP, 212Hl:CCP, 212Hm:CCC, 212Hn:CCP, 212Ho:CCP, 212Hp:CCP, 212Hq:CCP, 212Hr:CCP, 212Hs:CCP, 212Ht:CCP, 212Hu:CCP, 212Hv:CCC, 212Hw:CCP, 212Hx:CCP, 212Hy:CCP, 212Ib:CCC, 212Ja:CCP, 212Jb:CCC, 212Jc:CCC, 212Jd:CCC, 212Je:CCP, 212Jf:CCP, 212Jj:CCP, 212Jk:CCP, 212Jl:CCP, 212Jm:CCC, 212Jn:CCP, 212Jo:CCP, 212Jr:CCP, 212Ka:CCC, 212Kb:CCC, 212La:CCC, 212Lb:CCP, 212Lc:CCP, 212Ld:CCP, 212Ma:CCP, 212Mb:CCC, 212Na:CCC, 212Nb:CCP, 212Nc:CCC, 212Nd:CCP, 212Oa:CCC, 221Ad:CPP, **221Ae:**CPP, 221Af:CPP, 221Ag:CPP, 221Ah:CPP, 221Al:CP?, **221Am:**CPP, **221Ba:**CPP, 221Bb:CPP, **221Bd:**CPP, **221Da:**CPP, 221Db:CPP, **221Dc:**CPP, 221Ea:CP?, 221Eb:CP?, 221Fa:CCP, 222Aa:CCC, 222Ad:CC?, 222Ae:CC?, 222Af:CCC, 222Al:CCC, 222Ia:CPP, 222Ib:CPP, 222Ic:CPP, 222Id:CPP, 222Ie:CPP, 222If:CPP, 222Jc:CCC, 222Jg:CCC, 222Ke:CCC, 222Kf:CCC, 222Kg:CCC, 222Lc:CCC, 222Ld:CCC, 222Lf:CCC, 222Mc:CCC, 222Md:CCC, 222Na:CCC, **232A:**CC, 251Aa:CCC, 251Dc:CCC, M212Ad:CP?, M212Ba:CCC, M212Bb:CCP, M212Ca:CPP, M212Cc:CPP, M212Cd:CPP, M212Da:CPP, M212Db:CPP, M212Dc:CPP, M212Ea:CPP, M212Eb:CPP, M212Fa:CPP, M212Fb:CPP, M221Aa:CCC, M221Ab:CCC, M221Ac:CCC, M221Ad:CCC, M221Ba:CCC, M221Bb:CCC, M221Be:CC?, M221C:CP, M221Da:CCC

Synonymy: Black Ash—American Elm—Red Maple: 39, in part (Eyre 1980); *Ulmus—Fraxinus* wetland forest (No. 25), in part (Vankat 1990)

References: Eyre 1980, Faber-Langendoen et al. 1996, Minnesota Natural Heritage Program (MNNHP) 1993, Vankat 1990

Authors: ECS, KP, MCS **Identifier:** A.347

FRAXINUS NIGRA—ACER RUBRUM—(LARIX LARICINA) / RHAMNUS ALNIFOLIA FOREST

Black Ash—Red Maple—(Tamarack) / Alderleaf Buckthorn Forest

[Rich Red Maple—Black Ash Swamp] **G?**

S1S3 01-08-15

State Estimated EO's: AC—Estimate 5–50 occurrences in state.

State Area: B—Estimate 150–1,500 acres in state. Patch sizes probably range from 5–50 acres.

Concept: Calcareous or circumneutral seepage swamps of Lower New England (LNE) and High Alleghenies (HAL) dominated by *Acer rubrum* and *Fraxinus nigra*. Associates include *Betula alleghaniensis, Larix laricina*, with shrubs *Toxicodendron vernix, Rhamnus alnifolia*, and diverse herb layer characterized by groundwater seepage with *Saxifraga pensylvanica, Cardamine bulbosa, Symplocarpus foetidus*; other more calciphilic herbs may include *Cypripedium reginae, Cypripedium parviflorum (= Cypripedium calceolus), Trollius laxus*.

Comments:

Range:

Other States/Provinces: CT:S?, MA:S?, NH:S?, NY:S?, PA:S?, RI:S?, VT:S?

Physiographic Province, Section, Subsection: 212F:PP, 212G:PP, 221A:PP, **221B:**PP, M212A:PP, M212B:PP, M221A:P?, M221B:PP, M221C:PP

Synonymy: Red maple-black ash forested swamp (CAP)

References:

Authors: ECS **Confidence:** 2 **Identifier:** CEGL006009

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

I.C.3.N.a.35. PINUS (RIGIDA, ECHINATA)—QUERCUS COCCINEA FOREST ALLIANCE
(Pitch Pine, Shortleaf Pine)—Scarlet Oak Forest Alliance

Concept:
Comments:
Range: This alliance is found in New Jersey, New York, and Massachusetts (?).
Other States/Provinces: MA? NJ NY
Physiographic Province, Section, Subsection: 212Db:P??, 212Ec:PPP, 212Fa:PPP, 212Fb:PPP, 212Fc:PPP, 212Fd:PPP, 212Ga:PPP, 212Gb:PPP, 221Aa:PPP, 221Ab:PPP, 221Ac:PP?, 221Ad:PPP, **221Ae:**PPP, 221Af:PPP, 221Ag:PPP, 221Ah:PPP, 221Ai:PPP, 221Aj:PPP, 221Ak:PPP, 221Al:PPP, **221Ba:**PPP, 221Bb:PPP, 221Bc:PPP, 221Db:PPP, 221Ea:P??, 221Eb:P??, 222Id:PPP, 231Ae:PPP, 231Al:PPP, 232Aa:CCC, **232Ab:**CCC, **232Ac:**CCC, M212Bb:PPP, M212Cc:PPP, M212Cd:PPP, M221Aa:PPP, M221Ab:PPP, M221Bb:PP?, M221Bd:PPP, M221Be:PPP, M221Bf:PPP, M221Ca:PPP, M221Cb:PPP, M221Cc:PPP, M221Cd:PPP, M221Da:PPP
Synonymy:
References:
Authors: ECS **Identifier:** A.415

PINUS (RIGIDA, ECHINATA)—QUERCUS COCCINEA / ILEX OPACA FOREST
Pitch Pine, Shortleaf Pine—Scarlet Oak / American Holly Forest

G?
S3 01-08-15

State Estimated EO's: C—Estimate 20–100 occurrences.
State Area: D—Estimate >10,000 acres in state. Patch sizes may be as large as 100–1,000 acres.

Concept: This closed mixed forest is characterized by *Pinus rigida, Quercus coccinea, Quercus alba, Quercus stellata*, and *Acer rubrum*. A subcanopy of *Ilex opaca* and *Cornus florida* is particularly characteristic of this type. The shrub layer is made up of *Gaylussacia baccata, Vaccinium pallidum, Clethra alnifolia, Ilex glabra*, and at lower frequencies, *Carya pallida* and *Rhododendron viscosum*. The herbaceous layer is sparse, generally *Chimaphila maculata* and *Pteridium aquilinum* are present at low cover. This forest experiences lower fire frequency than other forest types of the pine barrens, as it is more protected and more mesic. The primary distribution of this forest is south of the Mullica River in southern NJ.
Comments:
Range:
Other States/Provinces:
Physiographic Province, Section, Subsection: 232Ab:CCC, **232Ac:**CCC
Synonymy:
References: Windisch 1995b
Authors: ECS **Confidence:** 2 **Identifier:** CEGL006115

PINUS RIGIDA—QUERCUS COCCINEA / VACCINIUM PALLIDUM—(MORELLA PENSYLVANICA) FOREST
Pitch Pine—Scarlet Oak / Hillside Blueberry—(Northern Bayberry) Forest
[Pitch pine—Oak Forest]

G?
S? 01-08-15

State Estimated EO's: —Not yet ranked in state.
State Area:

Concept: Matrix forest type of the central pine barrens of Long Island, New York, and possibly elsewhere. Canopy species include *Pinus rigida, Quercus coccinea, Quercus velutina, Quercus alba*. *Quercus ilicifolia, Vaccinium pallidum, Morella pensylvanica (= Myrica pensylvanica)* form a shrub layer, and the sparse herb layer is characterized by *Pteridium aquilinum* and *Carex pensylvanica*.
Comments:
Range:
Other States/Provinces: MA?, NY:S?
Physiographic Province, Section, Subsection: 221Ab:???, 232Aa:CCC, **232Ab:**CCC
Synonymy:
References: Breden 1989, Reschke 1990, Windisch 1995b
Authors: ECS **Confidence:** 2 **Identifier:** CEGL006381

I.C.3.N.a.21. PINUS STROBUS—QUERCUS (ALBA, RUBRA, VELUTINA) FOREST ALLIANCE

Eastern White Pine—(White Oak, Northern Red Oak, Black Oak) Forest Alliance

Concept: This alliance occurs from the western Great Lakes to the northeastern United States and south to the southern Appalachian Mountains. The overstory is a mix of evergreen and deciduous trees which form a moderately closed to closed canopy. *Pinus strobus* is a consistent constituent of the canopy and usually occurs as supercanopy trees, as well. *Quercus alba, Quercus rubra*, and *Quercus velutina* are also important canopy trees along with minor amounts of *Acer rubrum, Carya alba, Liriodendron tulipifera, Pinus resinosa, Pinus banksiana* (in Wisconsin), *Populus tremuloides* (in the northern parts of this alliance's range), *Quercus ellipsoidalis* (in the northwest), and *Tsuga canadensis*, and *Quercus prinus* (in the southeast). Subcanopy trees can include *Carpinus caroliniana, Cornus florida, Hamamelis virginiana, Halesia tetraptera, Oxydendrum arboreum*, and *Nyssa sylvatica*. The shrub layer is often well-developed with *Gaylussacia* spp., *Kalmia latifolia, Rubus* spp., and *Vaccinium* spp. most commonly dominant. Other shrubs can include *Corylus americana, Gaultheria procumbens, Rhododendron maximum*, and *Sassafras albidum*, and in the Ridge and Valley, *Viburnum rafinesquianum* and *Viburnum prunifolium*. The herb stratum is sparse to moderate, but can be quite species rich, especially in the Southern Blue Ridge and Ridge and Valley, where typical species include *Ageratina altissima, Amphicarpaea bracteata, Brachyelytrum erectum, Carex communis, Carex platyphylla, Carex woodii, Carex pensylvanica, Chimaphila maculata, Desmodium nudiflorum, Eupatorium purpureum, Galax urceolata, Galium latifolium, Galium circaezans, Geranium maculatum, Goodyera pubescens, Hexastylis shuttleworthii, Hieracium venosum, Houstonia purpurea, Maianthemum racemosum, Maianthemum canadense, Medeola virginiana, Mitchella repens, Monotropa uniflora, Poa cuspidata, Polygonatum biflorum, Polystichum acrostichoides, Trillium catesbaei*, and *Viola hastata*. Stands of this alliance are dry-mesic to mesic forests found on acidic, relatively nutrient-poor, sandy loam to sandy soil on a variety of topographic positions. In the upper Midwest, most stands are on flat to rolling topography on outwash plains or moraines. In the Southern Blue Ridge, they occur on mid to lower slopes in the lower elevations (below 3000 feet) on protected ridges, and in disturbed bottoms. In the Ridge and Valley of Virginia, these forests are found on protected ravines, with rocky soils developed over shale, sandstone, or other sedimentary rock.
Comments: In the Appalachians, these forests are typically transitional between the more mesic, protected cove forests and the more xeric, exposed pine—oak forests with *Quercus prinus* and *Quercus coccinea*. Stands of this alliance are mid-successional but long-lasting and require repeated disturbances to regenerate (MNNHP 1993). Isolated stands of *Pinus strobus* with *Quercus alba* and *Quercus velutina* and scattered *Fagus grandifolia* over *Kalmia latifolia* are found on steep slopes of the Western Highland Rim of (Cheatham and Dickson counties; Chester 1980). Similar isolated stands with *Pinus*

strobus are found in the vicinity of Clifty, Kentucky. Their status is unclear as well. These occur on sandstones of the Dripping Springs escarpment (Logan, Muhlenburg, Todd counties). "These are along Clifty Creek Gorge and Rocky Creek/Lake Malone State Park area; no botanical person has reported from here for a long time. The environment is not necessarily more xeric." (Julian Campbell, TNC-KYFO).

Range: This alliance is found in northern Minnesota, Wisconsin, Michigan, northern Illinois, Indiana, Connecticut, Maine, Maryland, Massachusetts, New Jersey, New York, Pennsylvania, Rhode Island, Virginia, West Virginia, northern Georgia, western North Carolina, western South Carolina, and eastern Tennessee (?). It is also found in Canada.

Other States/Provinces: CT GA IL? IN? MA MD ME MI MN NC NH NJ? NY ON PA QC? RI SC TN? VA VT WI WV

Physiographic Province, Section, Subsection: 212Aa:CPP, 212Ab:CPP, 212Ba:CPP, 212Bb:CPP, 212Ca:CCP, 212Cb:CCC, 212Da:CPP, 212Dc:CPP, 212Ec:CPP, 212Ed:CPP, 212Fa:CCP, 212Fb:CCP, 212Fc:CCP, 212Fd:CCP, 212Ga:CCP, 212Gb:CCP, 212Hb:CCP, 212He:CCC, 212Hi:CCP, 212Hj:CCC, 212Hl:CCC, 212Hm:CCP, 212Ho:CCC, 212Hp:CCC, 212Hq:CCC, 212Hr:CCP, 212Hs:CCP, 212Ht:CCP, 212Hu:CCC, 212Hv:CCC, 212Hw:CCC, 212Hx:CCP, 212Hy:CCC, 212Ja:CCP, 212Jb:CCC, 212Jc:CCP, 212Jf:CCP, 212Jj:CCP, 212Jl:CCP, 212Jm:CCC, 212Jn:CCP, 212Jr:CCC, 212Ka:CCP, 212Kb:CCC, 212La:CPP, 212Lb:CP?, 212Mb:CPP, 212Na:CPP, 212Nb:CPP, 212Nc:CPP, 212Oa:CCC, 212Oc:CCC, 221Aa:CCC, 221Ab:CCP, 221Ac:CCC, **221Ae:**CCC, 221Af:CCP, 221Ag:CCC, 221Ah:CCC, 221Ai:CCC, 221Aj:CCP, 221Ak:CCC, 221Al:CCC, **221Am:**CCP, **221Ba:**CCP, 221Bb:CCP, 221Bc:CCP, 221Db:CPP, 221Ec:CCC, 222Eg:CCC, 222Ic:CCP, 222Id:CCP, 222If:CCP, 222Ja:CCC, 222Jc:CCC, 222Jd:CCC, 222Je:CCC, 222Jg:CCC, 222Jj:CCC, 222Ka:CCC, 222Kh:CCC, 222Lc:CCC, 222Lf:CCC, 222Mc:CCC, 222Md:CCC, 222Me:CCC, 232Aa:CCC, M212Ac:CC?, M212Ad:CCC, M212Ae:CCP, M212Ba:CCP, M212Bb:CCC, M212Bc:CCC, M212Bd:CCC, M212Ca:CCP, M212Cb:CCC, M212Cc:CCC, M212Cd:CCP, M212Db:CCP, M212Dc:CCC, M212De:CCC, M212Ea:CP?, M212Eb:CPP, M221Aa:CCC, M221Ab:CCC, M221Ac:CCC, M221Ad:CCC, M221Ba:CC?, M221Bb:CCC, M221Bc:CC?, M221Bd:CCC, M221Be:CCC, M221Bf:CCC, M221Ca:CC?, M221Cb:CCP, M221Da:CCC, M221Dc:CCC, M221Dd:CCC

Synonymy: Hardwood—White Pine Forest, in part (Ambrose 1990a); Dry-Mesic Oak—Hickory Forest, in part (Schafale and Weakley 1990); Eastern White Pine: 21, in part (Eyre 1980); White Pine—Chestnut Oak: 51, in part (Eyre 1980); White Pine—Northern Red Oak—Red Maple: 20 (Eyre 1980); *Pinus strobus—Pinus resinosa* forest (No. 36), in part (Vankat 1990); Northern Dry-mesic Forest, in part (Curtis 1959)

References: Ambrose 1990a, Chester and Scott 1980, Curtis 1959, Eyre 1980, Faber-Langendoen et al. 1996, Minnesota Natural Heritage Program (MNNHP) 1993, Rawinski et al. 1996, Schafale and Weakley 1990, Vankat 1990

Authors: S. SIMON 8-94, MOD. A.S. , KP, ECS **Identifier:** A.401

PINUS STROBUS—QUERCUS (RUBRA, VELUTINA)—FAGUS GRANDIFOLIA FOREST
Eastern White Pine—(Northern Red Oak, Black Oak)—American Beech Forest
[White Pine—Oak Forest] **G5**
S? 01-08-15

State Estimated EO's: —Not yet ranked in New Jersey.
State Area:

Concept: This dry-mesic to mesic white pine—oak forest of northeastern states occurs on acidic, nutrient-poor, sandy loam to sandy soils. In the northern glaciated portion of the range, the forest occurs on outwash plains or moraines, as well as mid and lower slopes, protected ravines, and protected ridges of shale, sandstone, or other sedimentary rock at elevations below 3000 feet throughout the range. The tree canopy

is dominated by *Pinus strobus* with a mixture of oaks including *Quercus velutina, Quercus rubra, Quercus alba, Quercus prinus*, and in the southern portions of the range, *Quercus coccinea*. *Fagus grandifolia* is characteristic but not always present. Other less frequent canopy associates may include *Acer rubrum, Carya alba, Populus tremuloides, Tsuga canadensis*, and at the northern range limit may include *Betula papyrifera, Picea rubens*, and *Populus grandidentata*. The variable subcanopy may include *Hamamelis virginiana*, with other species such as *Carpinus caroliniana, Cornus florida, Oxydendrum arboreum*, and *Nyssa sylvatica* more frequent in the central and southern portions of the range. The sparse to well-developed, generally ericaceous shrub layer includes *Gaylussacia* spp., *Kalmia latifolia, Vaccinium* spp., as well as *Rubus* spp., *Corylus americana, Gaultheria procumbens, Sassafras albidum, Viburnum prunifolium*. The herb layer ranges from sparse to moderately dense cover and includes *Aralia nudicaulis, Ageratina altissima, Amphicarpaea bracteata, Brachyelytrum erectum, Carex communis, Carex platyphylla, Carex woodii, Carex pensylvanica, Carex lucorum, Carex debilis, Melampyrum lineare, Pteridium aquilinum, Trientalis borealis, Gaultheria procumbens, Chimaphila maculata, Desmodium nudiflorum, Galium latifolium, Galium circaezans, Geranium maculatum, Goodyera pubescens, Hieracium venosum, Houstonia purpurea, Maianthemum racemosum, Maianthemum canadense, Medeola virginiana, Mitchella repens, Monotropa uniflora, Poa cuspidata, Polygonatum biflorum, Polystichum acrostichoides, Viola hastata*. The bryophyte layer is not well documented but supports *Leucobryum glaucum* and *Polytrichum commune* in occurrences in the northern portion of the range (Acadia National Park). This association is differentiated from mixed oak—pine forests to the south by *Fagus grandifolia* and the absence of southern ranging species *Liriodendron tulipifera, Galax urceolata, Trillium catesbaei, Halesia tetraptera*, and others. The absence of *Ilex glabra* and the unimportance of *Quercus alba* differentiates this from a closely related association of northeastern coastal areas, *Pinus strobus—Quercus alba / Ilex glabra* Forest (CEGL006382).

Comments:

Range:

Other States/Provinces: CT:S?, MA:S?, ME:S?, NH:S?, NJ?, NY:S?, PA:S?, RI:S?, VT:S?, WV:S?

Physiographic Province, Section, Subsection: 212Cb:CCC, 212Fb:CCP, 212G:CC, 221Aa:CCC, 221Ac:CCC, **221Ae:**CCC, 221Af:CCP, 221Ag:CCC, 221Ah:CCC, 221Ai:CCC, 221Ak:CCC, 221Al:CCC, **221Ba:**CCC, 221Bb:CCP, 221Bc:CCC, 222Id:CCP, M212Ad:CCC, M212Ae:CCP, M212Ba:CCP, M212Bb:CCC, M212Bc:CCC, M212Bd:CCC, M212Cb:CCC, M212Cc:CCC, M212Db:CCP, M212Dc:CCC, M212De:CCC, M221Aa:CCC, M221Ac:CCC, M221Ad:CCC, M221Bb:CCC, M221Bf:CCC, M221Da:CCC

Synonymy: White pine-oak-beech dry forest (large patch to matrix) (CAP)

References: Enser 1993, Kuchler 1956, Maine Natural Heritage Program (MENHP) 1991, Metzler and Barrett 1996, Moore and Taylor 1927, Reschke 1990, Sperduto 1997b, Thompson 1996

Authors: ECS **Confidence:** 2 **Identifier:** CEGL006293

I.C.3.N.a.27. PINUS VIRGINIANA—QUERCUS (ALBA, STELLATA, FALCATA, VELUTINA) FOREST ALLIANCE

Virginia Pine—(White Oak, Post Oak, Southern Red Oak, Black Oak) Forest Alliance

Concept: This alliance includes forests with mixed evergreen/deciduous canopies composed primarily of *Pinus virginiana*, with various admixtures of the nominal *Quercus* spp. (*Quercus alba, Quercus stellata, Quercus falcata, Quercus velutina*). The application of this alliance is currently restricted to the pine barrens of New Jersey, Delaware and Maryland.

Comments: Communities of the southeastern United States formerly attributed to this alliance are now covered in *Pinus virginiana* Forest Alliance (A.131) and other deciduous alliances. Further review is needed to ascertain whether or not this alliance

is applicable to vegetation of the Piedmont, Shawnee Hills of Kentucky (J. Campbell pers. comm.), and possibly other parts of the Interior Low Plateau.
Range: Vegetation of this alliance is found in Delaware, Maryland, and New Jersey. Its attribution to Virginia and West Virginia is unclear.
Other States/Provinces: DE MD NJ
Physiographic Province, Section, Subsection: 232Ab:CPP, **232Ac:**CPP, 232Bt:CCC, 232Bx:CCC
Synonymy: Virginia Pine—Oak: 78, in part (Eyre 1980)
References: Chapman 1957, Eyre 1980, Schmalzer and DeSelm 1982
Authors: ECS **Identifier:** A.407

PINUS VIRGINIANA—QUERCUS FALCATA—CARYA PALLIDA FOREST
Virginia Pine—Southern Red Oak—Sand Hickory Forest
[Inland Dune Ridge Forest] **G?**
S? 01-08-15

State Estimated EO's: ?—Not yet ranked in New Jersey.
State Area:

Concept: This xeric pine forest of the central Atlantic Coastal Plain occurs on inland sand dune ridges. *Pinus virginiana* is codominant with a variety of oak species, including *Quercus falcata, Quercus nigra, Quercus alba, Quercus stellata*, and *Quercus velutina*. *Carya pallida* is characteristic of this association. Other canopy and subcanopy associates may include *Sassafras albidum, Pinus taeda, Quercus prinus, Quercus marilandica, Prunus serotina, Cornus florida, Nyssa sylvatica*, and *Diospyros virginiana*. The shrub layer may include *Gaylussacia frondosa, Ilex opaca, Vaccinium pallidum, Gaylussacia baccata*, and *Vaccinium stamineum*. The herbaceous layer is generally sparse, but is more abundant in openings. Characteristic herbs may include *Cypripedium acaule, Carex* spp., *Dichanthelium commutatum, Dichanthelium ovale, Chimaphila maculata, Melampyrum lineare*, and *Mitchella repens*. Less frequent species may include *Euphorbia ipecacuanhae, Baptisia tinctoria, Lupinus perennis, Pteridium aquilinum, Chimaphila umbellata, Monotropa uniflora*, and *Desmodium strictum*. Lichens of the genera *Cladonia* and *Cladina* are common. Vines such as *Smilax glauca, Smilax rotundifolia, Parthenocissus quinquefolia*, and *Vitis rotundifolia* are common at low cover.
Comments:
Range:
Other States/Provinces: DE:S?, MD:S?,
Physiographic Province, Section, Subsection: 232Ab:CPP, **232Ac:**CPP, 232Bt:CCC, 232Bx:CCC
Synonymy:
References: Bowman 2000, Breden 1989, Clancy 1996
Authors: ECS **Confidence:** 3 **Identifier:** CEGL006354

I.C.3.N.a.32. TSUGA CANADENSIS—BETULA ALLEGHANIENSIS FOREST ALLIANCE
Eastern Hemlock—Yellow Birch Forest Alliance

Concept: This alliance is found in the Great Lakes region and the northeastern United States and can range as far south as the Southern Blue Ridge of North Carolina and Tennessee, where it can occur in high-elevation areas. Forests in this alliance are late successional upland forests, dominated by coniferous and deciduous trees. *Tsuga canadensis* and some combination of *Acer saccharum, Betula alleghaniensis*, and *Fagus grandifolia* are typically the dominant trees. *Fagus grandifolia* is not found in stands west of eastern Wisconsin. Associated trees include *Acer rubrum, Betula lenta* (in the eastern portion of this alliance's range), *Carya* spp. (in the south), *Liriodendron tulipifera* (in the

south), *Pinus strobus, Prunus serotina var. serotina* (in the Allegheny Mountains), *Quercus alba, Quercus rubra*, and *Ulmus americana*. *Picea rubens* can be found in northern New England. The small tree *Ostrya virginiana* is often present in the subcanopy. In the northern portions of this alliance's range, the shade from the canopy and dense stands of *Acer saccharum* saplings and seedlings inhibits the growth of many other species. These stands often have depauperate ground layer strata. Where the shade is not as complete, shrubs such as *Corylus cornuta, Diervilla lonicera, Hamamelis virginiana, Sambucus racemosa var. racemosa (= Sambucus pubens)*, and *Viburnum lantanoides (= Viburnum alnifolium)* may be found along with saplings of *Abies balsamea* and *Picea glauca*. In the southern portion of this alliance's range, ericaceous shrubs are common. Among these *Kalmia latifolia, Rhododendron maximum*, and *Vaccinium pallidum* are typically the most abundant. The herbaceous layer consists of species such as *Anemone quinquefolia, Cornus canadensis* (in the north), *Dryopteris carthusiana* (in the north), *Epigaea repens, Maianthemum canadense, Medeola virginiana, Mitchella repens, Oxalis montana* (in the east), *Trientalis borealis* (in the north), *Trillium grandiflorum* (in the north), and *Viola* spp. Stands of this alliance tend to be on dry-mesic to mesic loam and sand soils. The soil is sometimes acidic, especially in the southern portion of this alliance's range. The parent material is glacial till in the north and sandstone in the unglaciated southern part. Stands can be on flat to moderately steep slopes of any aspect.

Comments:

Range: This alliance occurs in Michigan and northern and southeastern Wisconsin. It is widespread in the eastern United States in Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, Virginia, and West Virginia. It is also found in Canada from southern Ontario east to Nova Scotia, and in the Southeast in Tennessee and possibly North Carolina (?).

Other States/Provinces: CT MA MD ME MI NB? NC? NH NJ NS NY ON PA RI TN VA VT WI WV

Physiographic Province, Section, Subsection: 212Aa:CCP, 212Ab:CCP, 212Ba:CCP, 212Bb:CCP, 212Ca:CCP, 212Cb:CCP, 212Da:CCP, 212Db:CCP, 212Dc:CCP, 212Ea:CCP, 212Ec:CCP, 212Ed:CCP, 212Fa:CCP, 212Fb:CCP, 212Fc:CCP, 212Fd:CCP, 212Ga:CCP, 212Gb:CCP, 212Ha:CCC, 212Hb:CCC, 212Hd:CCC, 212He:CCC, 212Hi:CCP, 212Hj:CCC, 212Hl:CCC, 212Hm:CCP, 212Hn:CCP, 212Ho:CCC, 212Hp:CCP, 212Hq:CCP, 212Hr:CCP, 212Hs:CCC, 212Ht:CCP, 212Hv:CCC, 212Hw:CCC, 212Hx:CCC, 212Ia:CCC, 212Ib:CCP, 212Ja:CCP, 212Jb:CCC, 212Jc:CCC, 212Je:CCP, 212Jf:CCP, 212Jj:CCC, 212Jk:CC?, 212Jl:CCC, 212Jm:CCC, 212Jn:CCC, 212Jo:CCP, 212Jr:CCC, 212Js:CCC, 212Lb:CCC, 212Oa:CCC, 212Oc:CCC, 212Pa:CCC, 221Aa:CCP, 221Ac:CC?, 221Ad:CCP, **221Ae:**CCP, 221Af:CCP, 221Ag:CCP, 221Ah:CCP, 221Ai:CCP, 221Ak:CCC, 221Al:CCP, **221Am:**CCP, **221Ba:**CCP, 221Bb:CCP, 221Bc:CCP, **221Bd:**CCP, **221Da:**CCP, 221Db:CCP, **221Dc:**CCP, 221Ea:CCC, 221Ec:CCC, 221Ed:CCC, 221Ef:CCC, 221Eg:CCC, 221Fa:CCC, 221Fb:CCC, 221Ja:C??, 222De:C??, 222Ek:CCC, 222Em:CCC, 222Hb:CCC, 222Hf:CCC, 222Ia:CCC, 222Ib:CCP, 222Ic:CCP, 222Id:CCP, 222Ie:CCP, 222If:CCP, 222Ja:CCC, 222Je:CCC, 222Jj:CCC, 222Ka:CCC, 222Lb:CCC, 222Lc:CCC, 222Ld:CCC, 231Aa:???, 231Ae:???, 231Ak:???, 231Ap:???, **232Ac:**PPP, 232Ad:PP?, 232Ba:P??, M212Aa:CC?, M212Ab:CC?, M212Ac:CCP, M212Ad:CCC, M212Ae:CCC, M212Af:CCC, M212Ba:CCC, M212Bb:CCP, M212Bc:CCC, M212Bd:CCP, M212Ca:CCC, M212Cb:CCC, M212Cc:CCC, M212Cd:CCC, M212Da:CCC, M212Db:CCC, M212Dc:CCC, M212Dd:CCC, M212De:CCC, M212Df:CCC, M212Ea:CCP, M212Eb:CCP, M212Fa:CCC, M212Fb:CCC, M221Aa:CCP, M221Ab:CCP, M221Ac:CCC, M221Ba:CCC, M221Bb:CCC, M221Bc:CCC, M221Bd:CCC, M221Be:CC?, M221Bf:CCP, M221Ca:C??, M221Cb:C??, M221Cc:C??, M221Cd:C??, M221Da:CCP, M221Db:CC?, M221Dc:CC?, M221Dd:CCC

Synonymy: Hemlock—Yellow Birch: 24 (Eyre 1980); Hemlock (Braun 1950); Hemlock-Hardwood Forests (Braun 1950); Beech-Hemlock Association (Braun 1928a); *Tsuga canadensis-Betula alleghaniensis/Rhododendron maximum* Forest (Newell et al. 1997)
References: Braun 1928a, Braun 1950, Eyre 1980, Faber-Langendoen et al. 1996, Kotar et al. 1988, Newell et al. 1997
Authors: ECS/MCS, KP, ECS **Identifier:** A.412

TSUGA CANADENSIS—BETULA ALLEGHANIENSIS—PRUNUS SEROTINA / RHODODENDRON MAXIMUM FOREST
Eastern Hemlock—Yellow Birch—Black Cherry / Great Rhododendron Forest
[Central Appalachian Hemlock—Northern Hardwood Forest] **G?** 97-12-31
S1S2 01-08-15

State Estimated EO's: B—Probably from 5–20 occurrences.
State Area: A—Likely less than 100 acres. Patch size from 1–20 acres?

Concept: Hemlock forests of the Alleghenies, generally with *Prunus serotina* as a prominent component. *Rhododendron maximum, Sambucus racemosa var. racemosa (= Sambucus pubens)* differentiates this from Lower New England type. In the Central Appalachians these are closed-canopy, late successional, mixed forests dominated by *Tsuga canadensis* with some combination of *Acer saccharum, Betula alleghaniensis*, and *Fagus grandifolia*. Associates include *Acer rubrum, Betula lenta, Carya* spp., *Pinus strobus, Prunus serotina, Quercus alba, Quercus rubra, Ulmus americana, Ostrya virginiana*. The variable shrub layer consists of *Corylus cornuta, Diervilla lonicera, Hamamelis virginiana, Viburnum lantanoides*, and ericads: *Kalmia latifolia, Rhododendron maximum, Vaccinium pallidum*. The herbaceous layer may include *Anemone quinquefolia, Cornus canadensis, Dryopteris carthusiana, Maianthemum canadense, Medeola virginiana, Mitchella repens, Oxalis montana, Trientalis borealis, Trillium grandiflorum, Trillium erectum*, and *Viola* spp. These communities are found on acidic, mesic, sandy loams and sands of glacial till or sandstone in rocky ravines to occasionally flats or moderately steep slopes of any aspect.
Comments:
Range:
Other States/Provinces: MD?, NY:S?, PA:S?, VA:S?, WV:S?
Physiographic Province, Section, Subsection: 212:C, **221Bd:CCP**, 221E:??, M221Ac:CCC, M221Ba:CCC, M221Bb:CCC, M221Bc:CCC, M221Bd:CCC, M221C:C?, M221Da:C??
Synonymy: Eastern hemlock-yellow birch-black cherry forest (CAP)
References:
Authors: ECS **Confidence:** 2 **Identifier:** CEGL006206

TSUGA CANADENSIS—BETULA ALLEGHANIENSIS LOWER NEW ENGLAND / NORTHERN PIEDMONT FOREST
Eastern Hemlock—Yellow Birch Lower New England / Northern Piedmont Forest
[Hemlock—Northern Hardwood Forest] **G4?** 97-12-31
S3 01-08-15

State Estimated EO's: C
State Area: C—Patch size 5–50 acres.

Concept: Mixed hemlock—northern hardwood forests of Lower New England / Northern Piedmont. *Tsuga canadensis* forms at least 50% of the canopy, and associated hardwoods usually include *Betula alleghaniensis, Fagus grandifolia, Acer saccharum*. This forest is usually described as mesic, but on drier sites, *Fagus grandifolia* and oaks may also be present in quantity, particularly *Quercus rubra*. The shrub layer may be dense to fairly open, and often includes *Viburnum acerifolium, Acer pensylvanicum*. Herbs may be

sparse, particularly in dense shade, but often include *Medeola virginiana, Oxalis montana, Mitchella repens, Maianthemum canadense, Trientalis borealis, Huperzia lucidula (= Lycopodium lucidulum)*, and *Thelypteris noveboracensis*. A bryophyte layer may be well-developed, often characterized by the liverwort *Bazzania trilobata*. Soils of this community are dry-mesic to mesic and acidic.

Comments:

Range:

Other States/Provinces: CT:S?, MA:S?, MD:S?, ME:S?, NH:S?, NY:S?, RI:S?, VA:S?, VT:S?, WV?

Physiographic Province, Section, Subsection: 212E:CC, 212Fb:CPP, 221Ak:CCC, **221B:**CC, **221D:**CC, 222Id:CCP, 232Ad:???, M212B:CC, M212C:CC

Synonymy: *Tsuga canadensis-Betula(all,lenta)-Quercus rubra* (NAP)

References: Breden 1989, Enser 1993, Fleming et al. 2001, Maine Natural Heritage Program (MENHP) 1991, Metzler and Barrett 1996, Reschke 1990, Smith 1983, Sperduto 1997b

Authors: ECS **Confidence:** 2 **Identifier:** CEGL006109

I.C.3.N.d. Saturated mixed needle-leaved evergreen—cold-deciduous forest

I.C.3.N.d.8. CHAMAECYPARIS THYOIDES—ACER RUBRUM SATURATED FOREST ALLIANCE

Atlantic White-cedar—Red Maple Saturated Forest Alliance

Concept:

Comments:

Range: This alliance is found in Delaware, Maryland, New Jersey, New York, Maine, Rhode Island, Connecticut, Massachusetts, and New Hampshire.

Other States/Provinces: CT DE MA MD ME NH NJ NY RI

Physiographic Province, Section, Subsection: 212Dc:PPP, 221Aa:CCP, 221Ab:CCC, 221Ac:CCC, 221Ad:CCC, **221Ae:**CCP, 221Af:CCP, 221Ag:CCP, 221Ah:CCP, 221Ai:CCP, 221Aj:CCP, 221Ak:CCC, 221Al:CCP, **221Am:**CCP, 221Bc:CPP, **221Bd:**CPP, 232Aa:CCC, **232Ac:**CCC, 232Ba:CPP, 232Bc:CPP, 232Br:CPP, 232Bt:CPP, 232Ch:CPP, M212Bb:PPP

Synonymy:

References:

Authors: ECS **Identifier:** A.448

CHAMAECYPARIS THYOIDES—ACER RUBRUM—MAGNOLIA VIRGINIANA FOREST
Atlantic White-cedar—Red Maple—Sweetbay Forest
[Coastal Plain Atlantic White-cedar Swamp] **G?**
S4 01-08-15

State Estimated EO's: D—More than 10,000 acres.
State Area: D—Patch size 1–100 acres.

Concept: Mixed Atlantic white-cedar—red maple swamp of New Jersey, Delaware, and Maryland. In addition to *Chamaecyparis thyoides* and *Acer rubrum*, other canopy associates include *Nyssa sylvatica, Magnolia virginiana*. The shrub layer is characterized by *Vaccinium corymbosum* or *Vaccinium formosum, Clethra alnifolia, Ilex glabra, Gaylussacia frondosa, Rhododendron viscosum*. The herbaceous layer may be sparse to moderate cover and includes species such as *Mitchella repens, Sarracenia purpurea, Triadenum virginicum, Pogonia ophioglossoides*. In canopy openings, *Peltandra virginica, Orontium aquaticum, Iris versicolor* may also occur. Sphagnum mosses form a moderately dense to dense bryophyte layer; species include *Sphagnum magellanicum, Sphagnum pulchrum, Sphagnum flavicomans, Sphagnum recurvum*, and *Sphagnum fallax*.

Comments:
Range:
Other States/Provinces: DE:S?, MD:S?
Physiographic Province, Section, Subsection: 232Ac:CCC, 232Bt:CPP, 232C:CP
Synonymy:
References: Breden 1989, Clancy 1996, Karlin 1988, Olsson 1979
Authors: ECS **Confidence:** 2 **Identifier:** CEGL006078

CHAMAECYPARIS THYOIDES—ACER RUBRUM LOWER NEW ENGLAND / NORTHERN PIEDMONT FOREST
Atlantic White-cedar—Red Maple Lower New England / Northern Piedmont Forest

G3G5
S1 01-08-15

State Estimated EO's: A
State Area: B—Patch size 1/2–30 acres.

Concept: Mixed Atlantic white-cedar swamp of Lower New England, Northern Piedmont and North Atlantic Coast ecoregions. In general, the high abundance of red maple reflects recovery from logging. For this reason, most occurrences of so-called 'cedar swamps' in the Northeast are truly mixed. In addition to the nominate species, *Nyssa sylvatica* may also occur in the canopy, but few other tree species contribute cover to this forest. The shrub layer is generally well-developed and usually includes *Vaccinium corymbosum, Clethra alnifolia, Rhododendron viscosum, Ilex glabra*, and *Ilex verticillata*. Herbs may include *Osmunda cinnamomea, Osmunda regalis, Thelypteris palustris, Gaultheria procumbens*. *Sphagnum* mosses are common.
Comments:
Range:
Other States/Provinces: CT:S?, MA:S?, ME:S?, NH:S?, NY:S?, RI:S?
Physiographic Province, Section, Subsection: 221Ab:CCC, 221Ac:CCC, 221Ad:CCC, 221Ak:CCC, 232Aa:CCC
Synonymy:
References: Enser 1993, Maine Natural Heritage Program (MENHP) 1991, Metzler 1997, Metzler and Barrett 1996, Reschke 1990, Sperduto 1997b, Sperduto and Ritter 1994
Authors: ECS **Confidence:** **Identifier:** CEGL006207

I.C.3.N.d.300. PINUS RIGIDA—ACER RUBRUM SATURATED FOREST ALLIANCE
Pitch Pine—Red Maple Saturated Forest Alliance

Concept: Saturated mixed woodland alliance characterized by the canopy species *Pinus rigida, Acer rubrum*, and *Nyssa sylvatica*. Substrate is saturated mineral soils, usually sand, with minimal organic horizon development. The shrub layer is variable, characterized by *Clethra alnifolia, Rhododendron viscosum, Vaccinium corymbosum, Leucothoe racemosa*.
Comments:
Range: This alliance is described from the New Jersey Pine Barrens but likely occurs in other states.
Other States/Provinces: NJ
Physiographic Province, Section, Subsection: 232Ab:CCC

Synonymy:
References: Windisch 1995b
Authors: L. SNEDDON, ECS **Identifier:** A.3005

PINUS RIGIDA—ACER RUBRUM / RHODODENDRON VISCOSUM FOREST
Pitch Pine—Red Maple / Swamp Azalea Forest
[Pitch Pine—Red Maple—Black Gum Palustrine Forest] **G?**
S3S4 01-08-16

State Estimated EO's: D—Estimated >100 occurrences.
State Area: C—Estimated 1,000–10,000 acres in state. Patch size ranges from 10–1,000 acres.

Concept: Mixed forest of saturated sands, codominated by *Pinus rigida* and *Acer rubrum*, with *Nyssa sylvatica* and *Magnolia virginiana* as frequent associates. The shrub layer is characterized by a number of species such as *Vaccinium corymbosum, Leucothoe racemosa, Gaylussacia frondosa*, but *Clethra alnifolia* and *Rhododendron viscosum* are particularly characteristic. *Sphagnum* mosses are common, and *Osmunda cinnamomea, Pteridium aquilinum*, and *Gaultheria procumbens* are common herbs.
Comments:
Range:
Other States/Provinces:
Physiographic Province, Section, Subsection: 232Ab:CCC
Synonymy:
References: Windisch 1995b
Authors: ECS **Confidence:** 2 **Identifier:** CEGL006389



II. Woodland

II. Woodland

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

II.A.4.N.a.26. PINUS RIGIDA WOODLAND ALLIANCE

Pitch Pine Woodland Alliance

Concept: This alliance includes evergreen woodlands of rock outcrops, summits, exposed slopes, or, less frequently, sandy soils. In the southeastern United States, associations are dominated by *Pinus rigida* with or without an admixture of *Pinus virginiana*. In the northeastern United States, associated canopy species include *Pinus resinosa, Pinus strobus*, and *Pinus banksiana*, sometimes with an understory of *Quercus ilicifolia*. In the northeastern United States, associations in this alliance occur on xeric, sandy terraces within the Coastal Plain from southern Maine to Cape Henlopen, Delaware, including paleodunes and other habitats of the New Jersey pine barrens. Examples also occur on coastal acidic rock outcrops and rocky summits of southern Maine, eastern New York, Nova Scotia, Canada, as well as on Cape Cod, Massachusetts. Other possible habitats include sand plains, flat glacial outwash plains, sand dunes and glacial till. In the North Atlantic Coast ecoregion, stands are on sandy soils, which are typically well-drained and nutrient-poor. The habitats are fire-maintained or with a maritime influence. In the southeastern United States, associations in this alliance occur at low elevations in the Ridge and Valley, and Cumberland Mountains, on sites outside the geographic range of *Pinus pungens*. Fire plays an important role in maintaining these communities, but on the most extreme sites, these communities are maintained by topo-edaphic conditions.

Photos left to right, top to bottom:
Acer rubrum—Fraxinus pennsylvanica / Polygonum spp. Woodland—color slide by Tom Breden
Pinus rigida / Chamaedaphne calyculata / Sphagnum spp. Woodland—color slide by Andy Windisch
Juniperus virginiana—Fraxinus americana / Danthonia spicata—Poa compressa Woodland—color slide by Kathleen Strakosch Walz
Pinus rigida / Gaylussacia dumosa / Calamovilfa brevipilis Woodland—color slide by Andy Windisch

Comments: In South Carolina, there are probably two associations, one fire-maintained on deeper soils of south-facing slopes in the Blue Ridge with scattered *Vaccinium* and patches of *Schizachyrium scoparium var. scoparium*, with *Liatris microcephala, Sorghastrum nutans, Aletris farinosa*, and *Xerophyllum asphodeloides*. The other is a rocky type that is neither fire-maintained nor grassy (B. Pittman pers. comm.).
Range: This alliance is found in Kentucky, North Carolina, South Carolina, Tennessee, Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Virginia (?), and West Virginia (?).
Other States/Provinces: CT DE KY MA ME NH NJ NS NY ON PA RI VA? VT WV
Physiographic Province, Section, Subsection: 212Ca:CCP, 212Cb:CCC, 212Da:CCP, 212Db:CCC, 212Dc:CCC, 212E:CC, 212Fa:CCP, 212Fb:CC?, 212Fc:CCP, 212Fd:CCP, 212Gb:CPP, 221Aa:CCP, 221Ab:CCC, 221Ac:CCP, 221Ad:CCP, **221Ae:**CCP, 221Af:CCC, 221Ag:CCP, 221Ah:CCC, 221Ai:CCC, 221Aj:CCP, 221Ak:CCP, 221Al:CCC, **221Am:**CCP, **221Ba:**CCC, 221Bb:CCC, 221Bc:CCC, **221Bd:**CCC, 221Hc:CCC, 221I:CC, 222If:???, 231Aa:CCC, 232Aa:CCC, **232Ab:**CCC, **232Ac:**CCC, M212A:CC, M212Bb:CCC, M212Bd:CCC, M212Cb:CCP, M212Cc:CCP, M212Cd:CCP, M212Dc:CCC, M212De:CCP, M212Ea:CCP, M212Eb:CC?, M221Aa:CCC, M221Ac:CCC, M221Ba:CCP, M221Bb:CCP, M221Bd:CC?, M221Be:CC?, M221Ce:CCC, M221Da:CCC, M221Dd:CCC
Synonymy: Pine savanna/woodland, in part (Evans 1991); Pine—Oak/Heath, in part (Schafale and Weakley 1990); Pitch Pine: 45, in part (Eyre 1980)
References: B. Pittman pers. comm., Evans 1991, Eyre 1980, Schafale and Weakley 1990
Authors: ECS, KP, ECS **Identifier:** A.524

PINUS RIGIDA—(PINUS ECHINATA) / QUERCUS (MARILANDICA, ILICIFOLIA) / VACCINIUM PALLIDUM WOODLAND
Pitch Pine—(Shortleaf Pine) / (Blackjack Oak, Bear Oak) / Hillside Blueberry Woodland
[Mid-Successional Pine—Oak Woodland] **G2?** 98-04-30
S3 01-08-16

State Estimated EO's: C—Estimated 21–100 occurrences.
State Area: C—Estimated between 1,000–10,000 acres in state. Patch sizes range from 10–5,000 acres.

Concept: Pitch pine-dominated woodland of the New Jersey pine barrens. Pines are dominant, but the characteristic presence of tree oaks (*Quercus alba, Quercus coccinea, Quercus velutina, Quercus prinus, Quercus stellata*) forming up to 35% of the canopy is an indication of a fire frequency that is less than that of the classic pine barrens type *Pinus rigida / Quercus (marilandica, ilicifolia) / Pyxidanthera barbulata* Woodland (CEGL006051). The presence of a well-developed shrub oak layer indicates a fire frequency greater than that of oak forests. The ground layer is characterized by heaths, generally *Vaccinium pallidum* and *Gaylussacia baccata*. Herbs are sparse, and may include *Gaultheria procumbens, Pteridium aquilinum*.
Comments:
Range:
Other States/Provinces: NY:S?
Physiographic Province, Section, Subsection: 232Aa:CCC, **232Ab:**CCP
Synonymy:
References: Windisch 1995b
Authors: ECS **Confidence:** 2 **Identifier:** CEGL006383

PINUS RIGIDA / CAREX PENSYLVANICA WOODLAND
Pitch Pine / Pennsylvania Sedge Woodland

G?
S2S3 01-08-16

State Estimated EO's: C—Estimated between 21–100 occurrences.
State Area: B—Estimated 100–1,000 acres in state. Patch size ranges from 1–50 acres.

Concept: Pine woodland of xeric sandy soils. *Pinus rigida* is the dominant tree, with *Sassafras albidum* a common associate. The sparse shrub layer is made up of *Vaccinium pallidum, Gaylussacia baccata, Quercus ilicifolia*. Vines may be common, including *Smilax glauca, Smilax rotundifolia*. *Carex pensylvanica* forms a well-developed herbaceous layer, with *Hudsonia ericoides* and bryophytes *Leucobryum glaucum, Cladonia subtenuis, Cladonia squamosa* also contributing cover. This community is anthropogenic in origin, but is also known to occur on paleodunes in the New Jersey Pine Barrens.
Comments:
Range:
Other States/Provinces:
Physiographic Province, Section, Subsection: 232Aa:CCP
Synonymy:
References: Windisch 1995a, Windisch 1995b
Authors: ECS **Confidence:** 2 **Identifier:** CEGL006385

PINUS RIGIDA / HUDSONIA TOMENTOSA WOODLAND
Pitch Pine / Woolly Beach-heather Woodland
[Pitch Pine Dune Woodland]

G2 98-12-08
S1? 01-08-15

State Estimated EO's: A—May be present in Island Beach State Park.
State Area: A—Probably less than 100 acres in state.

Concept: This maritime pitch pine woodland occurs on coastal sand dunes from southern Maine to Cape Henlopen, Delaware. The community occurs on back dunes that are somewhat more stabilized than the oceanward foredunes. However, active sand movement occurs with storm activity, causing the boundaries of the community to migrate over time. The pitch pine-dominated canopy averages 10–15 m in height, but is quite variable, ranging from 1 m in an unusual shrub form in Delaware to over 20 m. Canopy associates include *Sassafras albidum, Juniperus virginiana*, and *Acer rubrum*, with scattered individuals of *Quercus rubra* and *Betula papyrifera* in the northern part of the range, and *Quercus falcata* and *Pinus virginiana* to the south. The shrub layer, if present, may include *Gaylussacia baccata, Gaylussacia frondosa, Vaccinium pallidum, Smilax rotundifolia*, and *Smilax glauca*. The ground layer is made up of herbs and dwarf-shrubs. *Hudsonia tomentosa*, although not present in all stands, is most characteristic over the range of the type. Associated herbs include *Dichanthelium ovale var. addisonii, Solidago odora, Chimaphila maculata*. Lichens may form a well-developed bryophyte layer. At Cape Henlopen State Park, species included *Cladonia strepsilis, Cladina terrae-novae, Lepraria incana*, and *Cladonia squamosa*.
Comments:
Range:
Other States/Provinces: DE:S?, MA:S?, ME:S?, NY:S?
Physiographic Province, Section, Subsection: 212D:CC, 221A:CC, **232A:**PP

Synonymy:
References: Delaware Natural Heritage Program 1998, Maine Natural Heritage Program (MENHP) 1991, Nelson and Fink 1980
Authors: ECS **Confidence:** 2 **Identifier:** CEGL006117

PINUS RIGIDA / QUERCUS (MARILANDICA, ILICIFOLIA) / PYXIDANTHERA BARBULATA WOODLAND
Pitch Pine / (Blackjack Oak, Bear Oak) / Pyxiemoss Woodland
[New Jersey Pitch Pine / Scrub Oak Barren] **G2** 98-12-02
S2 01-08-15

State Estimated EO's: B—Between 6–20 occurrences.
State Area: D—Estimate >10,000 acres in state. Patch size ranges from 100–25,000 acres.

Concept: This pine barrens community is restricted to the New Jersey Pine Barrens. It is a highly fire-dependent community, occurring most frequently on warmer microclimates of knoll crests and slopes where it is least effected by cold air drainage. The open canopy is strongly dominated by *Pinus rigida*, with very low cover of deciduous trees. Oaks, when present, may include *Quercus stellata* or *Quercus velutina*. The understory is dominated by *Quercus marilandica*, with lesser cover of *Quercus ilicifolia*. A low heath shrub layer is dominated by *Vaccinium pallidum* and *Gaylussacia baccata*. The herbaceous layer is of variable cover, depending on fire frequency and intensity. *Pyxidanthera barbulata* is characteristic of the type, although may not be present in all stands. Other herbaceous associates include *Schizachyrium scoparium, Andropogon virginicus, Carex pensylvanica, Minuartia caroliniana, Gaultheria procumbens, Pteridium aquilinum, Tephrosia virginiana, Helianthemum canadense*, and *Lechea* spp.
Comments:
Range: The association is restricted to the New Jersey coastal plain.
Other States/Provinces:
Physiographic Province, Section, Subsection: 232Ab:CCC, **232Ac:**CCC
Synonymy: Dry pine—oak forest, pine-blackjack oak forest subtype (Breden 1989), pitch pine—blackjack oak barrens (Windisch 1995b)
References: Breden 1989, Windisch 1995b
Authors: ECS **Confidence:** 1 **Identifier:** CEGL006051

PINUS RIGIDA / QUERCUS ILICIFOLIA—KALMIA ANGUSTIFOLIA / PYXIDANTHERA BARBULATA WOODLAND
Pitch Pine / Bear Oak—Sheep Laurel / Pyxiemoss Woodland
[New Jersey Mesic Pine Barrens] **G2?** 98-04-30
S3 01-08-15

State Estimated EO's: C—Estimate between 21–100 occurrences.
State Area: B—Estimated between 100–1,000 acres in state. Patch sizes <10 acres for most areas between Pitch pine lowlands and uplands.

Concept: Mesic pine barrens vegetation dominated by *Pinus rigida* with a shrub layer dominated by *Quercus ilicifolia*. The presence of mesic species such as *Kalmia angustifolia, Ilex glabra, Lyonia mariana, Leucothoe racemosa, Clethra alnifolia, Vaccinium corymbosum* indicate more mesic conditions such as the higher clay content of the soils, the position adjacent to a wetland, or a water table below the soil surface. Other associates include *Pyxidanthera barbulata, Morella pensylvanica (= Myrica pensylvanica), Photinia melanocarpa (= Aronia melanocarpa), Gaultheria procumbens, Carex pensylvanica* and *Pteridium aquilinum*. In New Jersey, *Xerophyllum asphodeloides* and *Calamovilfa brevipilis* are also found in this vegetation.

Comments:
Range:
Other Other States/Provinces: NY:S?
Physiographic Province, Section, Subsection: 232Aa:CCC, **232Ab:**CCC
Synonymy:
References:
Authors: ECS **Confidence:** 2 **Identifier:** CEGL006384

PINUS RIGIDA / QUERCUS ILICIFOLIA / MORELLA PENSYLVANICA WOODLAND
Pitch Pine / Bear Oak / Northern Bayberry Woodland
[Coastal Pitch Pine / Scrub Oak Barren] **G3**
S? 01-08-15

State Estimated EO's:—Not yet ranked in New Jersey.
State Area:

Concept: Pine barrens in the North Atlantic Coast ecoregion, sandy soils, fire maintained, maritime influence.
Comments:
Range:
Other Other States/Provinces: MA:S?, NY:S?, RI:S?
Physiographic Province, Section, Subsection: 221Ab:CCC, 221Ac:CCP, 232Aa:CCC, **232Ab:**CCC
Synonymy:
References:
Authors: ECS **Confidence:** 1 **Identifier:** CEGL006315

PINUS RIGIDA / QUERCUS ILICIFOLIA / PHOTINIA MELANOCARPA WOODLAND
Pitch Pine / Bear Oak / Black Chokeberry Woodland
[High Allegheny Pine Barrens] **G4G5**
S1 01-08-15

State Estimated EO's: B
State Area: A—Probably less than 100 acres in state. Patch sizes range from .5–5 acres.

Concept: Ridgetop pine barrens in the High Allegheny Plateau and Central Appalachian regions.
Comments:
Range:
Other Other States/Provinces: MA:S?, NY:S?, PA:S?, VA?, WV?
Physiographic Province, Section, Subsection: 212F:CC, **221Bd:CCP**, M212C:CP, M212E:CC, M221Aa:CCC, M221Ac:CCC, M221B:CC, M221Da:CCC
Synonymy: Pitch pine/scrub oak/black chokeberry low-mid elevation ridgetop (CAP)
References:
Authors: ECS **Confidence:** 2 **Identifier:** CEGL006323

II.A.4.N.b. Conical-crowned temperate or subpolar needle-leaved evergreen woodland

II.A.4.N.b.2. JUNIPERUS VIRGINIANA WOODLAND ALLIANCE

Eastern Red-cedar Woodland Alliance

Concept: This alliance, found in the central, eastern, and southeastern United States, contains rocky woodlands dominated by *Juniperus virginiana*. Associated woody species include *Quercus muehlenbergii, Quercus stellata, Celtis tenuifolia, Ulmus alata, Cercis canadensis*, and *Fraxinus quadrangulata* on calcareous or circumneutral sites; and *Liquidambar styraciflua* and others on old fields. Some examples occur as shale woodlands in the Ouachita Mountains, rimrock glades and cliffs, and as fire-suppressed glades and prairies. Some examples occur on rich granitic substrates in the Piedmont. In Louisiana, this community is found on calcareous clays of the Jackson Formation. This alliance occurs in the Piedmont, Interior Low Plateau, West Gulf Coastal Plain, Ozark Plateau, Ouachita Mountains, and Arkansas Valley. More information is needed on the range of variability and the exact distribution of this alliance.
Note that *Juniperus virginiana var. virginiana*-dominated communities occurring in old pastures, cleared calcareous areas, and so forth are placed in the I.A.8.N.c *Juniperus virginiana* Forest Alliance (A.137), whether the canopy is closed or open.

Comments: In Louisiana, this alliance is found on calcareous clays of the Jackson Formation. Some examples occur on rich granitic substrates in the Piedmont.

Range: This alliance is found in southern Indiana, southern Missouri, Alabama (?), Arkansas, Georgia, Kentucky (?), Louisiana, North Carolina, Tennessee, Maryland, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, and Virginia (?), and in Ontario, Canada.

Other Other States/Provinces: AL? AR CT DE GA KY LA MA MD? MO NC NH? NJ NY ON RI SC? TN VA? VT WV

Physiographic Province, Section, Subsection: 212A:CC, 212B:CC, 212Ee:CC?, 221A:CC, 221Hc:C??, 221Jb:CCC, 222Ad:CC?, 222Ae:CC?, 222Af:CCP, 222Ag:CCP, 222Am:CC?, 222Ca:CCC, 222Cb:CCC, 222Cg:CCC, 222Da:CCC, 222Db:CCC, 222Dc:CCC, 222Dj:CCC, 222Ea:CCC, 222Eb:CCC, 222Ec:CCC, 222Ed:CCC, 222Eg:CCC, 222Ej:CCC, 222Ek:CCC, 222En:CCC, 222Eo:CCC, 222Fc:CCC, 222Fd:CCC, 222I:CC, 231Ad:CCC, 231Af:CCC, 231Ba:CCC, 231Be:CC?, 231Cc:CC?, 231Cd:CC?, 231Cf:CCC, 231Da:CCC, 231E:CC, 231Ga:CCP, 231Gb:CCC, **232A:**CC, 232Bj:CCC, 232Bz:CCC, 232Fa:CCC, 234Ab:???, 234Ac:???, 251E:CC, 251F:CC, 255Ad:CCC, 311A:CC, 332E:CC, M221:C, M222A:CC, M231A:CC

Synonymy: Juniper—Hardwood Woodland, in part (Foti 1994b); Piedmont Acidic Cliff, in part (Schafale and Weakley 1990); Granitic Flatrock, in part (Schafale and Weakley 1990); *Juniperus virginiana / Schizachyrium scoparium* woodland association (Hoagland 1997); T2A2bI. *Juniperus virginiana—Quercus spp.*, in part (Foti et al. 1994); Eastern Redcedar: 46, in part (Eyre 1980); No equivalent (Diamond 1993)

References: Eyre 1980, Faber-Langendoen et al. 1996, Foti 1994a, Foti 1994b, Foti et al. 1994, Hoagland 1997, Schafale and Weakley 1990

Authors: D.J. ALLARD, KP, MCS **Identifier:** A.545

JUNIPERUS VIRGINIANA—FRAXINUS AMERICANA / DANTHONIA SPICATA—POA COMPRESSA WOODLAND
Eastern Red-cedar—White Ash / Poverty Oatgrass / Canada Bluegrass Woodland
[Traprock Ridge] **G2G3** 97-11-16
S1S2 01-08-15

State Estimated EO's: B—7–11 total estimated occurrences.
State Area: B—Less than 1,500 acres in state. Patch sizes range from 1–150 or 200 acres; most are 40 acres or less.

Concept: This traprock ridge community is known from mountainous sites in New England and New Jersey, and may occur in southeastern New York. The vegetation occurs primarily on exposed outcrops of basaltic rock in the Connecticut Valley of New England and the Piedmont physiographic province in New Jersey. Sites supporting this community are upper slopes of basalt or diorite ridges from 365-1050 m elevation, characteristically south- or west-facing and range in slope from 5-30 degrees. Most sites have minimal soil development. Tree cover is sparse, ranging from 5-30% cover (average 20%) with *Juniperus virginiana* being the most constant canopy tree. Other woody species sometimes present may include *Fraxinus americana, Quercus rubra, Ostrya virginiana*, and *Carya glabra*. The scattered shrub layer often includes *Rosa carolina, Quercus prinus, Rhus typhina (= Rhus hirta), Vaccinium pallidum, Viburnum rafinesquianum*, and *Prunus virginiana*. The herbaceous layer usually covers 12-50% of the ground and is dominated by *Schizachyrium scoparium* and *Danthonia spicata*, with the relative abundance of either varying from site to site. Numerous other herbaceous species and graminoid forbs occur in this community type, including *Carex pensylvanica, Hypericum gentianoides, Antennaria plantaginifolia, Corydalis sempervirens, Solidago nemoralis, Poa compressa, Maianthemum racemosum, Uvularia perfoliata, Aquilegia canadensis, Asclepias verticillata, Krigia virginica*, and *Houstonia longifolia (= Hedyotis longifolia)*. No species is restricted to this community but the assemblage listed above is very characteristic.
Comments:
Range: This community is known from Connecticut, Massachusetts, and New Jersey; it may also occur in New Hampshire and southeastern New York.
Other States/Provinces: CT:S?, MA:S?, NH?, NY?, ON:S?
Physiographic Province, Section, Subsection: 212A:CC, 212B:CC, **221Dc:CCC**
Synonymy:
References: Breden 1989, Grossman et al. 1994, Lee 1985, Motzkin 1993, Nichols 1914, Roberts 1914, Walz 1996
Authors: ECS **Confidence:** 2 **Identifier:** CEGL006002

JUNIPERUS VIRGINIANA VAR. VIRGINIANA / MORELLA PENSYLVANICA WOODLAND
Eastern Red-cedar / Northern Bayberry Woodland
[Maritime Red-cedar Woodland] **G2** 97-11-18
S1 01-08-15

State Estimated EO's: AB—5–10 occurrences.
State Area: B—Less than 1,000 acres in state. Patch size ranges 1–350 acres.

Concept: This maritime woodland community occurs on sand dunes and the upper edges of salt marshes, and less commonly on rocky headlands of the northern and mid-Atlantic coast. It is dominated by *Juniperus virginiana*. The physiognomy of this association is variable, ranging from dense tall-shrub thickets to open woodlands. *Juniperus* may form pure stands, but more often grows in association with *Pinus rigida, Quercus stellata, Prunus serotina, Amelanchier canadensis, Ilex opaca*, or *Quercus velutina*. Shrubs may include *Morella pensylvanica (= Myrica pensylvanica), (Morella cerifera (= Myrica cerifera)* at

the southern end of the range), Juniperus communis, and herbs are usually patchily distributed in openings. They include *Opuntia humifusa, Toxicodendron radicans, Parthenocissus quinquefolia*, and *Lechea intermedia*. Physiognomy is variable, but trees are generally shorter than 4 m. May be mixed with other conifers and deciduous species, but *Juniperus* is the most abundant tree.
Comments:
Range:
Other States/Provinces: CT:S?, DE:S?, MA:S?, NH?, NY:S?
Physiographic Province, Section, Subsection: 221A:CC, **232A:**CC, 232Bz:CCC
Synonymy:
References: Clancy 1996, Reschke 1990
Authors: ECS **Confidence:** 2 **Identifier:** CEGL006212

II.A.4.N.e. Seasonally flooded temperate or subpolar needle-leaved evergreen woodland

II.A.4.N.e.3. CHAMAECYPARIS THYOIDES SEASONALLY FLOODED WOODLAND ALLIANCE

Atlantic White-cedar Seasonally Flooded Woodland Alliance

Concept:
Comments:
Range: This alliance is found in New York, New Jersey, Massachusetts, Delaware, and Maryland (?).
Other States/Provinces: DE MA MD? NJ NY
Physiographic Province, Section, Subsection: 232Aa:CCP, **232Ac:**CC?, 232Ba:C??, 232Bb:C??, 232Bc:C??
Synonymy:
References:
Authors: ECS **Identifier:** A.571

Chamaecyparis thyoides North Atlantic Coast Woodland
Atlantic White-cedar North Atlantic Coast Woodland

G3G4
S? 01-08-15

State Estimated EO's: —Not ranked for New Jersey.
State Area:

Concept: Open Atlantic white-cedar swamps associated with coastal plain ponds, in the north Atlantic coast region.
Comments:
Range:
Other States/Provinces: MA:S?, NY:S?
Physiographic Province, Section, Subsection: 232A:CP
Synonymy:
References:
Authors: ECS **Confidence:** 2 **Identifier:** CEGL006297

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

II.A.4.N.f.13. PICEA MARIANA SATURATED WOODLAND ALLIANCE

Black Spruce Saturated Woodland Alliance

Concept: This alliance is found in the Great Lakes and northeastern parts of the United States and throughout the boreal region in Canada. Tree canopy cover is variable but generally exceeds 25%. Stunted *Picea mariana* trees (<10 m tall) dominate the canopy, which may also include scattered *Larix laricina*. The dwarf-shrub layer is dominated by ericaceous species, such as *Ledum groenlandicum, Chamaedaphne calyculata, Andromeda polifolia var. glaucophylla (= Andromeda glaucophylla)*, and *Kalmia polifolia*. Herbaceous species include *Carex trisperma* and *Eriophorum vaginatum*. *Sphagnum* mosses (usually *Sphagnum fuscum, Sphagnum angustifolium*, and *Sphagnum magellanicum*) cover the ground layer, with scattered feathermosses *Pleurozium schreberi, Dicranum undulatum*, and *Polytrichum strictum*. Species considered diagnostic for this alliance in northern Minnesota and Ontario, when compared to the *Chamaedaphne calyculata* Saturated Dwarf-shrubland Alliance (A.1092), include *Vaccinium vitis-idaea, Gaultheria hispidula, Maianthemum trifolium*, and *Carex trisperma*, but this needs rangewide review.
This alliance is best developed on the crests and upper slopes of raised bogs within bog complexes, but is also found in basin bogs and occasionally on shores (but isolated from groundwater contact). Here, sphagnum mosses can prevent most tree reproduction except that of *Picea mariana* and *Larix laricina*, which can reproduce by layering. The substrate consists of deep, fibric peat.

This alliance consists of bay forests dominated by *Gordonia lasianthus*, with closed or moderately open canopy. This alliance occurs in streamhead pocosins, other peaty streamhead situations, large peat dome pocosins, peat-filled Carolina bays, and seeps at slope bases. The closed, broad-leaved evergreen canopy is dominated by *Gordonia lasianthus*, though other bays (*Magnolia virginiana* and *Persea palustris), Acer rubrum, Pinus serotina*, and *Pinus elliottii var. elliottii* may occur. This alliance presumably can occur as a mosaic with the *Magnolia virginiana—Persea palustris* Saturated Forest Alliance (A.60), as well as with other pocosin/baygall vegetation types. Associated shrubs include *Cyrilla racemiflora, Clethra alnifolia, Itea virginica, Lyonia lucida, Ilex glabra*, and *Cephalanthus occidentalis*. Vines (*Smilax laurifolia, Smilax glauca, Vitis rotundifolia*) and ferns (*Osmunda cinnamomea, Osmunda regalis var. spectabilis*, and *Woodwardia areolata*) also occur. *Peltandra virginica* is a characteristic herbaceous species.

Comments: This alliance commonly grades into the *Picea mariana* Saturated Forest Alliance (A.197), or black spruce swamps, but usually lacks many of the minerotrophic indicators, such as *Carex aquatilis, Carex stricta, Carex leptalea, Betula pumila*, or even *Calamagrostis canadensis* and *Alnus incana* (Harris et al. 1996, MNNHP 1993). The physiognomic distinctions between the two alliances is not always clear, and it may be that they could be combined or have more useful floristic indicators added to the names.

Range: This alliance is found in Connecticut, Massachusetts, Maine, New Hampshire, New Jersey (?), New York, Pennsylvania, Rhode Island, Vermont, Michigan, Minnesota, and Wisconsin; and throughout the boreal region of Canada.

Other States/Provinces: CT MA ME NH NJ NY PA RI VT

Physiographic Province, Section, Subsection: 212Aa:CCP, 212Ab:CCP, 212Ba:CCP, 212Bb:CCP, 212Ca:CCP, 212Cb:CCC, 212Da:CCP, 212Db:CCP, 212Dc:CCP, 212Ea:CC?, 212Eb:CCP, 212Ec:CCP, 212Ed:CCP, 212Fa:CCP, 212Fb:CCP, 212Fc:CCP, 212Ga:CCP, 212Gb:CCP, 212Hb:CPP, 212Hh:CPP, 212Hi:CPP, 212Hj:CPP, 212Hp:CPP, 212Hq:CPP, 212Hr:CPP, 212Hs:CPP, 212Hw:CPP, 212Hy:CPP, 212Ja:CCP, 212Jb:CCP, 212Jc:CCC, 212Je:CCC, 212Jf:CCP, 212Jj:CCP, 212Jl:CCP, 212Jm:CCP, 212Jn:CCP, 212Ka:CCP, 212Kb:CCC, 212La:CCC, 212Lb:CCC, 212Lc:CCP, 212Ld:CC?, 212Ma:CCP, 212Mb:CCC,

212Na:CCC, 212Nb:CCP, 212Nc:CCC, 212Nd:CCP, 221Ac:CCP, **221Ae:**CCC, 221Af:CCP, 221Ah:CCP, 221Ai:CCP, 221Ak:CCP, 221Al:CCP, **221Ba:**CCP, 221Bb:CCP, 221Bc:CCP, **221Bd:**CCC, **221Dc:**CPP, 222Ia:CC?, 222Ib:CC?, 222Ic:CCP, 222Id:CCP, 222Ie:CC?, 222If:CCP, 222Ke:CCC, 222Na:CCC, M212Aa:CC?, M212Ab:CC?, M212Ac:CCP, M212Ad:CCP, M212Ba:CPP, M212Bb:CPP, M212Ca:CCP, M212Cc:CCP, M212Cd:CCP, M212Da:CCP, M212Db:CCP, M212Dc:CCP, M212Ea:CPP, M212Eb:CPP, M212Fa:CPP, M212Fb:CPP

Synonymy: Black Spruce: 12, in part (Eyre 1980)

References: Eyre 1980, Faber-Langendoen et al. 1996, Harris et al. 1996, Minnesota Natural Heritage Program (MNNHP) 1993

Authors: ECS **Identifier:** A.585

PICEA MARIANA / (VACCINIUM CORYMBOSUM, GAYLUSSACIA BACCATA) / SPHAGNUM SP. WOODLAND

Black Spruce / (Highbush Blueberry, Black Huckleberry) / Peatmoss species Woodland [Black Spruce Woodland Bog] **G3G5**

S1 01-08-16

State Estimated EO's: A—5 or fewer occurrences estimated for state.

State Area: B—Less than 150 acres in state. Patch size ranges from 1/4–80 acres.

Concept: This black spruce bog association represents the southern range limit of the alliance, ranging from New England to just south of the glacial border. This vegetation generally occurs in kettlehole basins and other well-defined topographic depressions and is characterized by relatively deep peat accumulation, indicating acidic, nutrient-poor conditions. The tree canopy ranges widely in closure. The dominant tree is *Picea mariana*, with associates including *Larix laricina* and *Abies balsamea*. The shrubs *Vaccinium corymbosum* and *Nemopanthus mucronatus* form a patchy tall-shrub layer. The dwarf-shrub layer is well-developed and characterized by a number of heaths including *Chamaedaphne calyculata, Gaylussacia baccata, Kalmia angustifolia*, and *Vaccinium angustifolium*. Common herbs may include *Carex trisperma, Rhynchospora alba, Drosera rotundifolia, Sarracenia purpurea, Eriophorum virginicum, Coptis trifolia*, and *Maianthemum trifolium*. The well-developed bryophyte layer is dominated by *Sphagnum magellanicum, Sphagnum girgensohnii, Bazzania trilobata, Aulacomnium palustre*, and *Pleurozium schreberi*. This association is further characterized by the presence of one or more tree or shrub species of more southern distribution, including *Betula populifolia, Tsuga canadensis, Pinus rigida, Alnus incana, Rhododendron viscosum, Photinia* spp. (= *Aronia* spp.), or *Lyonia ligustrina*. Additional species that further indicate southern range affinity or the influence of slightly higher nutrient levels from adjacent uplands may be present, including *Carex folliculata, Carex crinita, Carex stricta, Osmunda cinnamomea, Symplocarpus foetidus, Iris versicolor*, or *Calla palustris*. Northern species, such as *Rhododendron canadense* or *Eriophorum vaginatum var. spissum (= Eriophorum spissum)*, are generally lacking.

Comments: This association is similar to *Picea mariana / Alnus incana / Sphagnum* spp. Forest (CEGL002452).

Range:

Other States/Provinces: CT:S?, MA:S3, ME:S?, NH:S2S3, NY:S?, PA:S?, RI:S?, VT:S?

Physiographic Province, Section, Subsection: 212Cb:CCC, 212F:CC, 212G:CC, **221Ae:**CCC, **221Bd:**CCC, **221Dc:**CPP

Synonymy: *Carex trisperma*—Black spruce forest (Damman and French 1987)

References: Damman and French 1987, Fike 1999, Maine Natural Heritage Program (MENHP) 1991, Metzler and Barrett 1996, Reschke 1990, Sperduto 1997a

Authors: ECS **Confidence:** 2 **Identifier:** CEGL006098

II.A.4.N.f.8. PINUS RIGIDA SATURATED WOODLAND ALLIANCE
Pitch Pine Saturated Woodland Alliance

Concept: Communities of this alliance are characterized by an open canopy of *Pinus rigida*, with an understory of ericaceous shrubs over a mat of *Sphagnum* moss. These wetlands are 'boggy' in nature, generally with saturated acidic soils and extensive peat accumulation. They form in poorly drained depressions or deeper basins, and on stream flats (not flooded except in very rare events), and sometimes have a floating bog mat. Canopy associates of this alliance include *Acer rubrum, Nyssa sylvatica*, and *Betula populifolia*. The shrub layer may be dominated by *Chamaedaphne calyculata*, or made up of *Vaccinium corymbosum, Rhododendron canadense, Kalmia angustifolia, Gaylussacia baccata*, or *Gaylussacia frondosa (= var. frondosa)*. The herbaceous stratum is generally characterized by *Eriophorum virginicum, Calopogon tuberosus*, and *Scirpus* spp. Northern occurrences may contain *Scheuchzeria palustris, Gaultheria procumbens*, and *Cornus canadensis*, while woodlands in the southern part of the main range support species such as *Orontium aquaticum, Lophiola aurea, Arethusa bulbosa, Helonias bullata, Xyris* spp., *Xerophyllum asphodeloides, Gentiana autumnalis, Muhlenbergia torreyana*, and *Calamovilfa brevipilis*. In the Southern Blue Ridge, *Kalmia carolina, Toxicodendron vernix, Gaylussacia baccata*, and *Symplocarpus foetidus* are components. In the New Jersey pine barrens, additional species include *Leiophyllum buxifolium* and *Polygala lutea*. This alliance occurs in the pine barrens of New Jersey, southern New England, and in the southern Blue Ridge of North Caroliana. This alliance is of very limited occurrence in the southeastern United States; it is more widespread farther north.

Comments: Vegetation that may belong in this alliance occurs in Kentucky (Rowan County), a forested siltstone seep with *Nyssa sylvatica, Acer rubrum*, and *Carex atlantica* (J. Campbell pers. comm.).

Range: This alliance occurs in the pine barrens of New Jersey, southern New England, and in the southern Blue Ridge of North Caroliana. This alliance is of very limited occurrence in the southeastern United States; it is more widespread farther north. It is found in North Carolina, Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, and possibly in Kentucky (?), Rhode Island (?), and elsewhere.

Other States/Provinces: CT GA MA ME NC NH NJ NY PA RI?

Physiographic Province, Section, Subsection: 212E:CP, 212Fd:CCC, 212G:C?, 221Aa:CC?, 221Ab:CCP, 221Ac:CCP, 221Ai:CC?, 221Ak:CCP, 221Al:CCP, **221Ba:**CC?, **221Bd:**CCC, **221D:**C?, 221I:CC, 222En:???, 222If:???, 232Aa:CCC, **232Ab:**CCC, M221Ba:CPP, M221Bb:CPP, M221Cd:CPP, M221Db:CCC

Synonymy: Southern Appalachian Bog, Northern Subtype, in part (Schafale and Weakley 1990); Pitch Pine: 45, in part (Eyre 1980)

References: Eyre 1980, J. Campbell pers. comm., Robichaud and Buell 1973, Schafale and Weakley 1990, Tiner 1985a

Authors: A.S. WEAKLEY 11-94, MOD. , KP, ECS **Identifier:** A.580

PINUS RIGIDA / CHAMAEDAPHNE CALYCULATA / SPHAGNUM SPP. WOODLAND
Pitch Pine / Leatherleaf / Peatmoss species Woodland

G3G5
S3S4 01-08-16

State Estimated EO's: D—Estimate more than 100 occurrences.
State Area: C—Estimate between 1,000–10,000 acres in state. Patch sizes 1–25 acres.

Concept: Pitch pine woodland swamps of the Lower New England ecoregion.

Comments:
Range:
Other States/Provinces: CT:S?, MA:S?, ME:S?, NH:S?, NY:S?, RI?
Physiographic Province, Section, Subsection: 221A:CC, **232Ab:**CCC
Synonymy:
References:
Authors: ECS **Confidence:** **Identifier:** CEGL006194

PINUS RIGIDA / GAYLUSSACIA BACCATA—KALMIA ANGUSTIFOLIA WOODLAND
Pitch Pine / Black Huckleberry—Sheep Laurel Woodland
[Pitch Pine Subhydric Lowland] **G?**
S4 01-08-16

State Estimated EO's: D—Estimated >100 occurrences.
State Area: D—Estimated >10,000 acres in state. Patch sizes range from 5–5,000 acres but most are a few hundred acres.

Concept: Pitch pine lowland of New Jersey characterized by 'subhydric' conditions. Soils are saturated sands, but the water table is below the soil surface in most cases. *Pinus rigida* forms an open canopy, with a well-developed shrub layer of *Gaylussacia baccata, Gaylussacia frondosa, Kalmia angustifolia*, with other less frequent associates such as *Ilex glabra, Lyonia mariana, Vaccinium corymbosum, Leiophyllum buxifolium*. The ground cover is characterized by *Pteridium aquilinum, Pyxidanthera barbulata, Xerophyllum asphodeloides, Calamovilfa brevipilis, Schizachyrium scoparium*.
Comments:
Range:
Other States/Provinces:
Physiographic Province, Section, Subsection: 232Ab:CCC
Synonymy:
References: Windisch 1995b
Authors: ECS **Confidence:** 2 **Identifier:** CEGL006387

PINUS RIGIDA / GAYLUSSACIA DUMOSA / CALAMOVILFA BREVIPILIS WOODLAND
Pitch Pine / Dwarf Huckleberry / Pinebarren Sandreed Woodland
[Pitch Pine Lowland; Pitch Pine—Pineland Reedgrass Savanna] **G1** 99-03-22
S1 01-08-16

State Estimated EO's: A—Estimated 1–5 occurrences.
State Area: B—Estimated between 100–1,000 acres in state. Patch size ranges from 25 acres to a few hundred acres.

Concept: Pitch pine saturated woodland known to date only from the New Jersey pine barrens. The community is characterized by an open canopy (10-50%) of *Pinus rigida* with a scattered shrub layer characterized by *Gaylussacia dumosa*, in association with *Gaylussacia baccata, Kalmia angustifolia, Ilex glabra, Vaccinium corymbosum, Chamaedaphne calyculata*. *Sphagnum* mosses are common. The herbaceous is characterized by high cover of *Calamovilfa brevipilis*. Associated herbs are varied in cover and frequency, but may include *Andropogon glomeratus, Gentiana autumnalis, Muhlenbergia torreyana, Amphicarpum purshii*. The rare lepidoptera *Agrotis buchholzi, Spartiniphaga carterae, Crambus daeckellus* are associated with this community.
Comments:
Range:
Other States/Provinces:
Physiographic Province, Section, Subsection: 232Ab:CCC

Synonymy:
References: Windisch 1995b
Authors: ECS **Confidence:** 2 **Identifier:** CEGL006388

PINUS RIGIDA / VACCINIUM CORYMBOSUM—LEUCOTHOE RACEMOSA / SPHAGNUM SPP. WOODLAND
Pitch Pine / Highbush Blueberry—Swamp Doghobble / Peatmoss species Woodland
[Pitch Pine Lowland] **G3** 98-12-10
S3S4 01-08-16

State Estimated EO's: D—100–200 estimated occurrences. Pitch pine / inkberry subtype has unknown number of estimated occurrences, 3 are known.

State Area: E—Estimate total state average to be 100,000 acres or more. 100–1000 acres patch size. Pitch pine / inkberry subtype (PPL-3) has much smaller patch size, generally less than 10 acres.

Concept: This pitch pine lowland community is restricted to the New Jersey Pine Barrens. This association is described as hydric, with a saturated hydrology. The open canopy is dominated by *Pinus rigida*, with *Acer rubrum, Nyssa sylvatica*, and *Amelanchier arborea* being infrequent associates. The shrub layer may be quite dense and is characterized by *Vaccinium corymbosum, Leucothoe racemosa, Gaylussacia frondosa, Gaylussacia baccata, Kalmia angustifolia*, and *Ilex glabra*. The herbaceous layer is not well developed. *Sphagnum* species are common in the bryophyte layer.
Comments:
Range: This association is restricted to the New Jersey Pine Barrens.
Other States/Provinces: NY:S?
Physiographic Province, Section, Subsection: 232A:CC
Synonymy:
References:
Authors: ECS **Confidence:** 1 **Identifier:** CEGL006195

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

II.B.2.N.a.25. QUERCUS STELLATA—QUERCUS MARILANDICA WOODLAND ALLIANCE

Post Oak—Blackjack Oak Woodland Alliance

Concept: This alliance includes open-canopy stands, typically dominated by *Quercus stellata* and/or *Quercus marilandica*, found throughout the southeastern and lower midwestern United States. These communities are physiognomically variable, locally varying from deciduous to mixed, often having substantial *Juniperus virginiana var. virginiana*, especially as a result of fire suppression. These post oak—blackjack oak barrens are more edaphically extreme or frequently burned than the corresponding I.B.2.N.a *Quercus stellata—Quercus marilandica* Forest Alliance (A.253), which is currently more common due to fire suppression. Some examples occur on 2:1 montmorillonitic clays, while others are on limestone-derived soils. Canopy and subcanopy associates, in addition to *Quercus stellata* and *Quercus marilandica*, may include *Juniperus virginiana var. virginiana, Pinus echinata, Pinus virginiana, Carya texana, Carya glabra, Cornus florida, Quercus alba, Quercus falcata, Quercus prinus, Quercus velutina, Diospyros virginiana, Chionanthus virginicus*, and *Vaccinium arboreum*. In associations on mafic substrates, *Carya carolinae-septentrionalis, Ulmus alata, Fraxinus americana*, and *Cercis canadensis* are common. *Acer rubrum* and *Liquidambar styraciflua* increase with disturbance. Shrubs may be sparse to dense, and species present include *Viburnum rafinesquianum, Ilex longipes, Symphoricarpos orbiculatus, Gaylussacia baccata, Rhododendron canescens,*

Vaccinium stamineum, Vaccinium corymbosum, and *Viburnum prunifolium*. A rare type that occurs in North and South Carolina has an herbaceous layer containing many prairie species such as *Silphium terebinthinaceum, Solidago nemoralis, Coreopsis major, Liatris aspera, Andropogon gerardii*, and *Sorghastrum nutans*. The most common herbaceous species are *Schizachyrium scoparium* and *Danthonia spicata*.

In Tennessee, woodlands in this alliance occur in the Central Basin and adjacent Highland Rim and may contain *Andropogon gerardii, Schizachyrium scoparium*, and/or *Sorghastrum nutans*. Pines are absent; instead, *Juniperus virginiana var. virginiana* may be present in the more-or-less open subcanopy. Shrubs in the Central Basin examples include *Forestiera ligustrina, Hypericum frondosum, Rhus aromatica*, and *Viburnum rufidulum*. Fire suppression in these sites may lead to dense undergrowth of *Juniperus*. In Louisiana and Texas (and in the Sandhills of the southeastern Coastal Plain), this alliance results mostly from pine removal and fire suppression, and examples only marginally fit this concept. This alliance occurs on xeric sites in northwestern Arkansas and may include some of Arkansas's glade/outcrop complexes and prairie communities, as well as ridgetop savanna / glade communities. This alliance is widespread throughout the southeastern and lower midwestern United States and occurs in the following regions: Ozarks, Interior Low Plateau, Boston Mountains, Southern Piedmont, Southern Ridge and Valley, Arkansas Valley, Ouachita Mountains, Atlantic Coastal Plain, Upper East Gulf Coastal Plain (Black Belt), Crowley's Ridge, and the Prairie Parkland.

Comments: This alliance is attributed to Fort Benning, Georgia, to represent more frequently burned or disturbed areas with dominance by *Quercus marilandica, Quercus stellata* over a grassy understory. An association is being described to accommodate this vegetation. The relationship of these stands either to related forests or to *Quercus laevis*-dominated stands is unknown.

Range: This alliance is widespread throughout the southeastern and lower midwestern United States and occurs in the following regions: Ozarks, Interior Low Plateau, Boston Mountains, Southern Piedmont, Southern Ridge and Valley, Arkansas Valley, Ouachita Mountains, Atlantic Coastal Plain, Upper East Gulf Coastal Plain (Black Belt), Crowley's Ridge, and the Prairie Parkland. It is found in Illinois, Indiana, Iowa (?), Kansas, Missouri, Virginia, Alabama, Arkansas, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, and Texas. In addition, an inland dune association of New Jersey (?) and New York is placed here.

Other States/Provinces: AL AR GA IA? IL IN KS KY LA MO MS NC NJ? NY OK SC TN TX VA

Physiographic Province, Section, Subsection: 221Dc:CCC, 221Ha:CCP, 221Hc:CCC, 221Hd:CCP, 221He:CCP, 221Ja:CCP, 221Jb:CCC, 221Jc:CCP, 222Aa:CCC, 222Ab:CCC, 222Ac:CCC, 222Ae:CCC, 222Af:CCC, 222Ag:CCC, 222Ah:CCC, 222Aj:CCC, 222Ak:CCC, 222Am:CCC, 222An:CCC, 222Aq:CCP, 222Ca:CCC, 222Cb:CCP, 222Cc:CCP, 222Cd:CCP, 222Ce:CCP, 222Cf:CCP, 222Cg:CCP, 222Ch:CCP, 222Da:CCP, 222Db:CCP, 222Dc:CCC, 222Dd:CCP, 222De:CCC, 222Dg:CCP, 222Dh:CCC, 222Di:CCP, 222Dj:CCP, 222Ea:CCP, 222Eb:CCC, 222Ec:CCC, 222Ed:CCC, 222Ee:CCP, 222Ef:CCP, 222Eg:CCC, 222Eh:CCC, 222Ei:CCP, 222Ej:CCP, 222Ek:CCP, 222En:CCP, 222Eo:CCP, 222Fa:CCP, 222Fb:CCP, 222Fc:CCP, 222Fd:CCP, 222Ff:CCP, 222Gb:CCC, 222Gc:CCP, 222Gd:CCP, 231Aa:CCP, 231Ab:CCP, 231Ac:CCP, 231Ad:CCP, 231Ae:CCC, 231Af:CCC, 231Ag:CCP, 231Ah:CCP, 231Ai:CCP, 231Aj:CCP, 231Ak:CCP, 231Al:CCP, 231Am:CCP, 231An:CCP, 231Ao:CCC, 231Ap:CCP, 231Ba:CCC, 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:CCC, 231Ce:CCP, 231Cf:CCP, 231Cg:CCP, 231Da:CCP, 231Db:CCP, 231Dc:CCP, 231Dd:CCP, 231De:CCP, 231Ea:CCC, 231Eb:CCC, 231Em:CCC, 231En:CCC, 231Ga:CCC, 231Gb:CCC, 231Gc:CCC, 232Bj:CC?, 232Bl:CC?, 232Bm:CC?,

232Bn:CC?, 232Bq:CCC, 232Fa:CPP, 234Ab:CCC, 234Ac:CCC, 234Ae:CCC, 234Ah:CC?, 251Cc:CCP, 251Cd:CCP, 251Ci:CCC, 251E:CC, 251Fc:CC?, 255Aa:CCC, 255Ab:CCC, 255Ac:CCP, 255Ad:CCC, 255Ae:CCC, 255Af:CCC, 255Ah:CCC, 255Ai:CCC, 255Aj:CCC, 255Ba:CCC, 255Ca:CCC, 255Cf:CCC, 311A:CC, M222Aa:CCC, M222Ab:CCC, M231Aa:CCC, M231Ab:CCC, M231Ac:CCC, M231Ad:CCC

Synonymy: IA6c. Dry Post Oak—Blackjack Oak Forest, in part (Allard 1990); Dry Post Oak-Blackjack Oak Forest, in part (Pyne 1994); Juniper—Hardwood Woodland (Foti 1994b); *Quercus stellata—Quercus marilandica* woodland series (Hoagland 1997); *Quercus marilandica* woodland series (Hoagland 1997); Post Oak-Blackjack Oak Series, in part (Diamond 1993); T2A2bI. *Juniperus virginiana—Quercus spp*. (Foti et al. 1994); T2B4aI1b. *Quercus stellata—Quercus marilandica—Carya texana* (Foti et al. 1994); Post Oak—Blackjack Oak: 40, in part (Eyre 1980); Eastern Redcedar: 46, in part (Eyre 1980)

References: Allard 1990, Burns and Honkala 1990b, Diamond 1993, Eyre 1980, Faber-Langendoen et al. 1996, Foti et al. 1994, Hoagland 1997, Nelson 1986, Pyne 1994, Schafale and Weakley 1990

Authors: D.J. ALLARD, KP, SCS **Identifier:** A.625

QUERCUS STELLATA—SASSAFRAS ALBIDUM / SMILAX GLAUCA WOODLAND
Post Oak—Sassafras / Whiteleaf Greenbrier Woodland

G? 98-04-15
S? 01-08-16

State Estimated EO's:—Not yet ranked for New Jersey.
State Area:

Concept: Woodland of inland unglaciated sand dune. Characterized by *Quercus stellata, Quercus marilandica, Sassafras albidum, Diospyros virginiana* with an understory of *Vaccinium pallidum* and an herb layer of *Panicum virgatum, Smilax glauca* and *Eupatorium hyssopifolium*. Currently known from Staten Island, New York, and suspected to occur in New Jersey.

Comments:
Range:
Other States/Provinces: NJ?, NY:S?
Physiographic Province, Section, Subsection: 221Dc:CCC
Synonymy:
References:
Authors: ECS **Confidence:** 3 **Identifier:** CEGL006372

II.B.2.N.f. Tidal cold-deciduous woodland

II.B.2.N.f.1. ACER RUBRUM—FRAXINUS PENNSYLVANICA TIDAL WOODLAND ALLIANCE

Red Maple—Green Ash Tidal Woodland Alliance

Concept: Tidal swamp woodlands of the mid-Atlantic that occur on tidal rivers and receive diurnal flooding with water less than 5 ppt salinity; waters generally oligohaline to fresh. This alliance includes swamp woodlands of low stature found at the fresh tidal marsh/streamside swamp forest boundary. The vegetation is a complex of regularly flooded tidal sediments and tree hummocks raised above the level of regular tidal influence. The hummocks support *Acer rubrum, Fraxinus pennsylvanica, Nyssa sylvatica*, and in Delaware, *Chamaecyparis thyoides*. One association in North Carolina contains *Acer negundo* in the canopy with lesser amounts of *Nyssa aquatica, Taxodium distichum*, and *Ulmus rubra*. Shrub and vine species include *Vaccinium corymbosum, Leucothoe*

racemosa, Rhododendron viscosum, Clethra alnifolia, Rosa palustris, Smilax rotundifolia, Smilax walteri, Ampelopsis arborea, Sicyos angulatus, Parthenocissus quinquefolia, Vitis rotundifolia, Matelea gonocarpos, Smilax rotundifolia, Clematis crispa, and *Toxicodendron radicans*. Herbaceous species that occur in the tidal sediments include *Zizania aquatica, Impatiens capensis, Acorus calamus, Cinna arundinacea, Nelumbo lutea, Mikania scandens, Peltandra virginica*, and *Sagittaria latifolia*.

Comments: This alliance may occur in Maryland on Nanticoke [see data collected by Smoot Major 9-95 and verify that these are woodlands and not forests]. Gary Fleming recommends moving at least the Virginia association to I.B.2.N.h *Fraxinus pennsylvanica—Acer rubrum—Ulmus americana* Tidal Forest Alliance (A.356).

Range: This alliance is found in North Carolina, Maryland (?), New Jersey, New York, and Virginia.

Other States/Provinces: DE MA MD NC NJ NY VA

Physiographic Province, Section, Subsection: 221Ac:CCP, **221Ba:**C??, 232Aa:CCP, **232Ac:**CCC, 232Ad:CCP, 232Ba:CC?, 232Bb:CC?, 232Br:CCP, 232Cb:CCC, 232Ch:CCC

Synonymy: Red Maple: 108, in part (Eyre 1980)

References: Eyre 1980

Authors: ECS, JT, ECS **Identifier:** A.658

ACER RUBRUM—FRAXINUS PENNSYLVANICA / POLYGONUM SPP. WOODLAND

Red Maple—Green Ash / Smartweed species Woodland

[Freshwater Tidal Woodland] **G2** 98-12-03

S1S2 01-08-16

State Estimated EO's: B—Estimate 5–20 occurrences.

State Area: C—More than 1,000 acres estimated to occur in state. Patch sizes range 5–100 acres.

Concept: This freshwater tidal woodland occurs on tidal rivers in Massachusetts, New York, and New Jersey. It is found on larger rivers with gradual slopes, and is flooded by diurnal tides. The substrate is very wet. The canopy is characterized by *Acer rubrum, Fraxinus pennsylvanica*, with *Ulmus rubra* and *Carpinus caroliniana* being frequent associates. The shrub layer is characterized by *Ilex verticillata, Alnus serrulata, Clethra alnifolia, Rhododendron viscosum, Vaccinium corymbosum, Lindera benzoin, Cornus racemosa*, and others. The herbaceous layer is characterized by *Peltandra virginica, Pontederia cordata, Impatiens capensis, Polygonum punctatum, Leersia oryzoides, Onoclea sensibilis, Pilea pumila, Polygonum hydropiper, Polygonum hydropiperoides, Asclepias incarnata*, and *Arisaema triphyllum*.

Comments:

Range: This association is confined to tidal rivers of Massachusetts, New York, and New Jersey.

Other States/Provinces: MA:S?, NY:S?

Physiographic Province, Section, Subsection: 221A:CC, **232A:**C?

Synonymy:

References: Breden 1988, Breden 1989, Reschke 1990

Authors: ECS **Confidence:** 2 **Identifier:** CEGL006165

II.C.3.N.a. Mixed needle-leaved evergreen—cold-deciduous woodland

II.C.3.N.a.19. PINUS RIGIDA—QUERCUS (COCCINEA, VELUTINA) WOODLAND ALLIANCE

Pitch Pine—(Scarlet Oak, Black Oak) Woodland Alliance

Concept: This alliance contains mixed woodlands of well-drained, nutrient-poor sandy soils, often closely associated with pine barrens communities. This alliance occurs less commonly on bedrock ledges. The canopy is usually dominated by *Pinus rigida* and *Quercus coccinea*, with *Quercus velutina, Quercus alba*, and *Pinus strobus* in association. *Quercus ilicifolia, Quercus prinoides* may form a subcanopy, and ericaceous shrubs such as *Gaylussacia baccata, Vaccinium angustifolium*, and *Vaccinium pallidum* are common. Light-demanding species are common in these communities: *Schizachyrium scoparium, Arctostaphylos uva-ursi, Carex pensylvanica, Hudsonia tomentosa, Hudsonia ericoides*, and *Lechea mucronata (= Lechea villosa)*.

Comments:

Range: This alliance occurs in New York, southern New England, and likely occurs in New Jersey. Its occurrence outside the northeastern United States has not yet been evaluated. It does not occur in Maryland.

Other States/Provinces: CT MA MD NH NJ NY PA RI WV

Physiographic Province, Section, Subsection: 212Fc:PPP, 212Fd:PP?, 221Aa:CCP, 221Ab:CCP, 221Ac:CCP, 221Ad:CCP, 221Af:CCP, 221Ai:CCP, 221Ak:CCC, 221Al:CCP, 221Bc:CCP, 232Aa:CCC, M212Bb:CPP, M212C:CC, M221Aa:CCP, M221Bd:CPP, M221Cb:CPP

Synonymy:

References:

Authors: ECS **Identifier:** A.687

PINUS RIGIDA—QUERCUS (COCCINEA, VELUTINA) / SCHIZACHYRIUM SCOPARIUM WOODLAND

Pitch Pine—(Scarlet Oak, Black Oak) / Little Bluestem Woodland

G3G5
S? 01-08-16

State Estimated EO's: ?—Not yet ranked for New Jersey.
State Area:

Concept: Dry oak—pine woodlands in the lower New England region and on dry eastern slopes in the high Alleghenies.

Comments:

Range:

Other States/Provinces: CT:S?, MA:S?, MD:S?, NH:S?, NY:S?, PA:S?, RI:S?, WV:S?

Physiographic Province, Section, Subsection: 221Ak:CCC, **221B:**CC, M212C:CC, M221A:CC, M221B:C?

Synonymy:

References:

Authors: ECS **Confidence:** 3 **Identifier:** CEGL006166

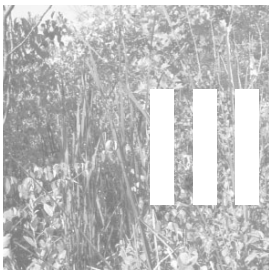
PINUS RIGIDA—QUERCUS VELUTINA / HUDSONIA TOMENTOSA WOODLAND

Pitch Pine—Black Oak / Woolly Beach-heather Woodland

G3G5
S? 01-08-16

State Estimated EO's: ?—Not yet ranked for New Jersey.
State Area:

Concept: Dry oak—pine woodlands in the north Atlantic coastal region.
Comments: This type is based on the pitch pine—oak—heath woodland of Reschke 1990.
Suggest changing */Hudsonia tomentosa* to *Hudsonia ericoides* in the name.
Range:
Other States/Provinces: CT:S?, MA:S?, NY:S?, RI:S?
Physiographic Province, Section, Subsection: 221A:CC, **221B:**CC, 232Aa:CCC
Synonymy:
References: Reschke 1990
Authors: ECS **Confidence:** **Identifier:** CEGL006120



III. Shrubland

III. Shrubland

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

III.A.2.N.i.100. MORELLA CERIFERA SATURATED SHRUBLAND ALLIANCE

Wax-myrtle Saturated Shrubland Alliance

Concept: This alliance includes wetland dune swales and other wetland shrubland situations dominated by *Morella cerifera (= Myrica cerifera)*, including sheltered backdunes, wetland flats, and interdune swales. Associated shrubs may include *Baccharis halimifolia, Acer rubrum, Vaccinium formosum, Rosa palustris, Ilex opaca var. opaca, Juniperus virginiana var. silicicola*, and *Morella pensylvanica (= Myrica pensylvanica)*. This shrubland vegetation can form vast thickets in some cases; there may be inclusions of small wetland graminoid-dominated areas. Vines may be frequent and can include *Toxicodendron radicans ssp. radicans, Smilax* spp., *Vitis* spp., and *Parthenocissus quinquefolia*. Associated herbaceous species can include *Boehmeria cylindrica, Calystegia sepium, Carex albolutescens, Carex hormathodes, Chasmanthium laxum, Festuca rubra, Galium obtusum, Hydrocotyle* spp., *Juncus dichotomus, Juncus scirpoides, Leersia virginica, Osmunda regalis var. spectabilis, Panicum* spp., *Polygonum pensylvanicum*, and *Woodwardia areolata* (in the northern part of the range); and *Andropogon glomeratus var. pumilus, Fimbristylis castanea, Hydrocotyle bonariensis, Juncus roemerianus, Muhlenbergia filipes*, as well as *Spartina patens* and *Sabatia stellaris* (in southern examples). This is maritime shrub vegetation which generally exists in a tension zone between more exposed or active grassland vegetation and more protected and stable maritime forests. Older stands of maritime shrub vegetation ultimately become dominated by stunted and salt-pruned

Photos, clockwise, top left:
Pinus rigida—Quercus marilandica / Corema conradii Shrubland—b&w photo by Robert Cartica
Pinus rigida—Quercus marilandica / Corema conradii Shrubland—color slide by Tom Breden
Betula pumila—Toxicodendron vernix—Dasiphora fruticosa ssp. floribunda Shrubland—color slide by Tara Bowers

Quercus virginiana. See also the III.A.2.N.c *Quercus virginiana—Ilex vomitoria—(Morella cerifera)* Shrubland Alliance (A.785), which generally occurs in drier and more exposed sites. Soils are deep sands of stabilized dunes, with limited if any horizon development. An overlying layer of 'muck' is reported in northern examples.

Comments:

Range: This alliance is found in Florida, Georgia, Louisiana, North Carolina, South Carolina, Delaware, Maryland, Virginia, and possibly New Jersey (?).

Other States/Provinces: DE FL GA LA MD NC NJ? SC VA

Physiographic Province, Section, Subsection: 232Ab:CPP, 232Ad:CPP, 232Bq:CC?, 232Bx:CCC, 232Bz:CCC, 232Cb:CCP, 232Ce:CCC, 232Ch:CCP, 232Ci:CCC, 232Gb:CCC

Synonymy: Coastal Interdunal Swale (Florida Natural Areas Inventory 1992a); Maritime interdune shrub vegetation (Ambrose 1990a); Maritime Shrub, in part (Schafale and Weakley 1990); mesic shrub zone, in part (Higgins et al. 1971); shrub succession community, in part (Hill 1986); thicket community, in part (Boule 1979); swamp thicket, in part (Klotz 1986)

References: Ambrose 1990a, Boule 1979, Florida Natural Areas Inventory 1992a, Higgins et al. 1971, Hill 1986, Klotz 1986, Schafale and Weakley 1990

Authors: A.S. WEAKLEY 9-94, MOD. E, MP, SCS **Identifier:** A.1906

MORELLA CERIFERA—BACCHARIS HALIMIFOLIA / SPARTINA PATENS SHRUBLAND
Wax-myrtle—Groundsel-tree / Saltmeadow Cordgrass Shrubland
[Maritime Shrubland] **G3G5** 95-11-14
S? 01-08-16

State Estimated EO's: ?—Not yet ranked for New Jersey.
State Area:

Concept: This mesic shrub community occurs on sheltered maritime backdunes of the mid-Atlantic states. The vegetation is not tidally flooded, although it is impacted by salt spray. The substrate is sand or loamy sand with little or no organic layer. The water table is often less than half a meter below the surface. This community is characterized by a moderately open canopy of *Morella cerifera (= Myrica cerifera), Baccharis halimifolia, Morella pensylvanica (= Myrica pensylvanica)*, and *Rhus copallinum*. *Spartina patens* and *Toxicodendron radicans* are characteristic of the herbaceous layer, with other associates include *Panicum virgatum, Andropogon virginicus, Juncus dichotomus, Solidago sempervirens, Smilax* spp., *Parthenocissus quinquefolia, Vitis* spp., and *Schoenoplectus pungens (= Scirpus pungens)*.

Comments:

Range:

Other States/Provinces: DE?, MD:S?, NC?, NJ?, SC?, VA:S?

Physiographic Province, Section, Subsection: 232Ab:CPP, 232Bz:CCC, 232Ch:CCP, 232Ci:CCP

Synonymy:

References: Boule 1979, Higgins et al. 1971, Hill 1986, Klotz 1986, Martin 1959b, Schafale and Weakley 1990

Authors: ECS **Confidence:** 2 **Identifier:** CEGL003809

III.A.3.N.a. Needle-leaved evergreen shrubland

III.A.3.N.a.3. PINUS RIGIDA SHRUBLAND ALLIANCE
Pitch Pine Shrubland Alliance

Concept:
Comments:
Range: This alliance is found in New York and New Jersey.
Other States/Provinces: NJ NY
Physiographic Province, Section, Subsection: 221Bd:CCC, 232Aa:CCC
Synonymy:
References:
Authors: ECS **Identifier:** A.809

PINUS RIGIDA—QUERCUS MARILANDICA / COREMA CONRADII SHRUBLAND
Pitch Pine / Blackjack Oak / Broom Crowberry Shrubland
[New Jersey Pine Plains] **G2** 98-12-08
S1 01-08-16

State Estimated EO's: A—Estimated 1–5 occurrences.
State Area: D—Total acres in state >10,000. Patch sizes range from 100–5,000 acres, mostly 100–1,000 acres with two main occurrences reaching 5,000 acres.

Concept: This dwarf pine plains community is restricted to the Outer Coastal Plain of New Jersey. The short stature of the vegetation is a result of very high fire frequency, which is fostered by dry sandy soil on flat to gently rolling topography and relative paucity of wetlands to act as firebreaks. Occurrences are found at elevations of 100-200 feet above sea level in gently rolling terrain. Soils are well-drained to poorly-drained, with high permeability, and a sand to sandy loam subsoil (Woodmansie-Lakehurst association). The dominant trees are dwarf (less than 3.4 m), multiple stemmed *Pinus rigida, Quercus marilandica*, and *Quercus ilicifolia*. *Pinus rigida* makes up 25-65% of the trees with the oak species making up the rest. There is a notable absence of *Pinus echinata* or any other oak species. Characteristic shrubs include *Kalmia latifolia, Kalmia angustifolia, Comptonia peregrina* and *Leiophyllum buxifolium*. The ground layer is comprised of dwarf-shrubs, forbs and grasses, including *Gaultheria procumbens, Arctostaphylos uva-ursi, Pyxidanthera barbulata, Epigaea repens, Hudsonia ericoides, Carex pensylvanica, Schizachyrium scoparium, Andropogon virginicus, Danthonia spicata, Pteridium aquilinum, Helianthemum canadense, Hypericum gentianoides*, and *Polygonella articulata*. *Corema conradii* is prominent in places. Lichens, such as *Cladonia caroliniana* and *Cladonia strepsilis*, sparsely cover the ground.
Comments:
Range: This vegetation is restricted to the outer coastal plain of New Jersey.
Other States/Provinces:
Physiographic Province, Section, Subsection: 232A:CC
Synonymy:
References: Breden 1989, Good and Good 1975a, Good et al. 1979, Grossman et al. 1994, Harshberger 1916, McCormick and Buell 1968, Windisch 1992
Authors: ECS **Confidence:** 1 **Identifier:** CEGL006148

III.B.2.N.a. Temperate cold-deciduous shrubland

III.B.2.N.a.9. MORELLA PENSYLVANICA—(PRUNUS MARITIMA) SHRUBLAND ALLIANCE

Northern Bayberry—(Beach Plum) Shrubland Alliance

Concept: Dune thickets of the Mid-Atlantic Coast; this alliance includes maritime shrublands dominated by *Morella pensylvanica (= Myrica pensylvanica)*, with *Baccharis halimifolia, Rhus copallinum*, and stunted individuals of *Pinus taeda*. *Prunus maritima* is characteristic of this community from Maryland to the north. The constant movement of sand in this community limits the herbaceous cover. Typical herbaceous species include *Ammophila breviligulata, Cenchrus tribuloides, Chamaesyce polygonifolia, Cyperus grayi, Dichanthelium acuminatum, Diodia teres, Hudsonia tomentosa, Lechea maritima, Oenothera humifusa, Panicum amarum var. amarulum, Parthenocissus quinquefolia, Rumex acetosella, Solidago sempervirens, Spartina patens, Toxicodendron radicans*, and *Triplasis purpurea*. This maritime shrubland usually occupies the intermediate areas between the very unstable oceanward portions of the dunes and the more protected backdunes, where it forms partially open to dense shrub thickets. The substrate is sand with no soil profile development, and with variable amounts of accumulated leaf litter. Where this community occupies the lee side of foredunes, greater exposure to winds and storms contributes to a shorter stature and more open aspect of the vegetation. Here there are large patches of open unvegetated or sparsely vegetated sand.

Comments:

Range: This alliance is found in North Carolina, Delaware, Maryland, Virginia, and others.

Other States/Provinces: CT DE MA MD ME NC NH NJ NY RI VA

Physiographic Province, Section, Subsection: 212A:CC, 212Cb:CPP, 212Db:CPP, 212Dc:CPP, 221Aa:PPP, 221Ab:PPP, 221Ac:PPP, 221Ad:PPP, 221Ai:PPP, 221Ak:PPP, 232Aa:CCP, **232Ab:**CCP, **232Ac:**CCC, 232Bc:CCP, 232Bd:CCP, 232Bz:CCC, 232Ch:CCP, 232Ci:CCC, 232Cj:CCP

Synonymy: Maritime Shrub, in part (Schafale and Weakley 1990); *Prunus maritima-Myrica pensylvanica* coastal dune scrub (Clancy 1993); dunegrass-shrub transition zone, in part (Higgins et al. 1971); shrub succession community, in part (Hill 1986); upland (dune) thicket, in part (Klotz 1986)

References: Clancy 1993, Higgins et al. 1971, Hill 1986, Klotz 1986, Schafale and Weakley 1990, Sneddon et al. 1996

Authors: ECS, MP, ECS **Identifier:** A.902

MORELLA PENSYLVANICA—ROSA RUGOSA SHRUBLAND

Northern Bayberry—Rugosa Rose Shrubland

G4

S1S2 01-08-16

State Estimated EO's: B—Estimate 6–20 occurrences in state.

State Area: B—Estimate 100–1,000 acres in state. Patch sizes range 20–100 acres.

Concept: Maritime dune shrublands of the North Atlantic Coast ecoregion.

Comments:

Range:

Other States/Provinces: CT:S?, DE:S?, MA:S?, ME:S?, NH:S?, NY:S?, RI:S?

Physiographic Province, Section, Subsection: 212A:CC, **232Ac:**CCC

Synonymy:

References:

Authors: ECS **Confidence:** 2 **Identifier:** CEGL006295

III.B.2.N.a.300. PRUNUS SEROTINA—AMELANCHIER CANADENSIS—QUERCUS SPP. SHRUBLAND ALLIANCE

Black Cherry—Canada Serviceberry—Oak species Shrubland Alliance

Concept: This alliance includes temperate deciduous maritime shrublands, generally occurring on the lee side of sand dunes. The physiognomy of this vegetation is highly variable and may range from open woodland to stunted forest to dense nearly impenetrable thicket. Individual trees tend to be wind-pruned and multiple-stemmed. The canopy may contain *Prunus serotina var. serotina, Amelanchier canadensis, Pinus taeda, Photinia pyrifolia (= Aronia arbutifolia)*, and *Sassafras albidum* in varying proportions. *Acer rubrum, Diospyros virginiana*, and *Malus angustifolia* may also be present; *Pinus taeda* and *Ilex opaca var. opaca* may occur locally. *Morella cerifera (= Myrica cerifera)* may form a subcanopy, but if the community is particularly stunted, this species may contribute substantially to the canopy as well. This vegetation combines with tall *Vaccinium formosum* to form dense thickets. Examples support vines in great abundance, such as *Smilax rotundifolia, Smilax glauca, Parthenocissus quinquefolia*, and *Toxicodendron radicans*. Herbs are generally scarce to entirely lacking, due to heavy shading from the dense canopy above, and when present are generally tree and vine seedlings sparsely scattered on the dry leaf litter. *Festuca rubra* and *Rumex acetosella* may also be present. Some examples on the coast are subject to salt spray and winds, exhibiting wind pruning. The substrate varies from pure sand directly adjacent to the ocean, to loamy sands in more sheltered areas. Vegetation in these sheltered areas is sometimes referred to as 'sunken forest.' This name refers to the topographic position of these examples, which are found in large depressions, lower in elevation (by 1–3 m) than the interdunes. These examples are shielded from strong prevailing winds and salt spray, which permits lush growth of broadleaf shrub and vine species.

Comments: The physiognomy is better described as shrubland, as height is generally <5 m and is comprised of multiple stems.

Range: This alliance is found in Connecticut, Delaware, Maryland, Massachusetts, New Hampshire, New Jersey, New York, and Virginia.

Other States/Provinces: CT DE MA MD NH NJ NY RI VA

Physiographic Province, Section, Subsection: 221Aa:CC?, 221Ab:CCC, 221Ac:CCP, 221Ad:CCC, 221Ak:CCC, **221D:**CP, 232Aa:CCC, **232Ab:**CCC, **232Ac:**CCC, 232Ad:CC?, 232Bb:CC?, 232Bc:CCP, 232Bd:CCP, 232Bz:CCC, 232C:CC

Synonymy: White Oak: 53, in part (Eyre 1980); Black Oak: 110, in part (Eyre 1980)

References: Bellis 1992, Boule 1979, Dunlop and Crow 1985, Eyre 1980, Higgins et al. 1971, Hill 1986, Martin 1959b, Sneddon et al. 1994, Stalter 1979

Authors: ECS 12-95, MOD., KP, ECS **Identifier:** A.237

AMELANCHIER CANADENSIS—VIBURNUM SPP.—MORELLA PENSYLVANICA SHRUBLAND

Canada Serviceberry—Viburnum species—Northern Bayberry Shrubland

[Successional Maritime Forest; Maritime Tall Shrubland] **G?**

S? 01-08-16

State Estimated EO's: ?—Not yet ranked for New Jersey.

State Area:

Concept: This tall maritime shrubland community characteristically replaces maritime forests that have been cleared. The community is variable in composition and generally includes *Amelanchier canadensis, Prunus serotina, Sassafras albidum, Nyssa sylvatica, Acer rubrum, Juniperus virginiana* in the canopy. The oaks *Quercus velutina, Quercus stellata, Quercus alba* may or may not be present. The shrubs *Morella pensylvanica (= Myrica pensylvanica), Photinia* spp. (= *Aronia* spp.), *Viburnum* spp. may form an understory or contribute substantial cover to the canopy. Vines are often prevalent, including *Smilax*

spp., *Vitis* spp., *Toxicodendron radicans, Parthenocissus quinquefolia*. The herbaceous layer is generally sparse. These shrublands are usually very dense, and often maintained in their current state by constant winds and salt spray.

Comments:

Range:

Other States/Provinces: CT:S?, MA:S?, NY:S?, RI:S?

Physiographic Province, Section, Subsection: 221Ab:CCC, 221Ad:CCC, 232Aa:CCC, **232Ab:**CCC

Synonymy:

References:

Authors: ECS **Confidence:** 2 **Identifier:** CEGL006379

PRUNUS SEROTINA—SASSAFRAS ALBIDUM—AMELANCHIER CANADENSIS / SMILAX ROTUNDIFOLIA SHRUBLAND

Black Cherry—Sassafras—Canada Serviceberry / Common Greenbrier Shrubland

[Northern Deciduous Maritime Scrub Forest] **G2G3** 97-10-22

S1S2 01-08-16

State Estimated EO's: B—Estimate 6–20 occurrences in state.

State Area: B—Estimate between 100–1,000 acres in state. Patch sizes range 1–100 acres.

Concept: This maritime tall shrubland community of the North Atlantic Coastal Ecoregion occurs on sheltered backdunes, bluffs, or more interior coastal areas not directly influenced by overwash but affected by salt spray and wind-pruning. Physiognomy is variable, and ranges from closed-canopy forest to open woodland to dense tall shrubland, and may be more accurately called scrub. Trees found in this community are usually stunted and flat-topped; the canopy may be only 3-7 m tall. Dominant trees vary locally and include *Sassafras albidum, Amelanchier canadensis, Quercus velutina* and *Prunus serotina* as relatively constant species, with admixtures of *Pinus rigida, Juniperus virginiana* and in southern occurrences *Quercus coccinea* and *Ilex opaca*. Additional shrub species may also contribute substantially to the canopy and include *Vaccinium corymbosum, Gaylussacia baccata, Photinia* spp. (= *Aronia* spp.), *Viburnum* spp., *Rosa* spp., and *Morella pensylvanica (= Myrica pensylvanica)*. A true shrub layer is generally not present or may be restricted to the edges of the occurrence. Any one of the tree species listed may be dominant in any given patch. The understory is dominated by vines such as *Parthenocissus quinquefolia, Toxicodendron radicans, Smilax rotundifolia, Smilax glauca*, and *Vitis* spp. probably reflecting the unstable quality of the substrate. Other herbaceous species include *Aralia nudicaulis* and *Maianthemum stellatum (= Smilacina stellata)*. Soils are coarse well-drained sand subject to considerable shifting during coastal storms, or till and sand deposits of terminal moraines.

Comments:

Range: The range of this community is from southern New Hampshire to New Jersey, but is restricted to the coast.

Other States/Provinces: CT:S?, MA:S?, NH:S1, NY:S?, RI:S?

Physiographic Province, Section, Subsection: 221Ab:CCC, 221Ac:CC?, 221Ad:CCC, 221Ak:CCC, **221D:**CP, 232Aa:CCC, **232Ab:**CCC, **232Ac:**CCP

Synonymy:

References: Art 1987, Bellis 1992, Breden 1989, Burk 1968, Dunlop and Crow 1985, Greller 1977, Martin 1959b, McDonnell 1979, Reschke 1990, Stalter 1979, Svenson 1970

Authors: ECS **Confidence:** 2 **Identifier:** CEGL006145

PRUNUS SEROTINA / MORELLA CERIFERA / SMILAX ROTUNDIFOLIA SHRUBLAND
Black Cherry / Wax-myrtle / Common Greenbrier Shrubland
[Chesapeake Bay Deciduous Maritime Shrub Forest] **G1G2** 97-11-18
S1 01-08-16

State Estimated EO's: A—5 or fewer occurrences in state.
State Area: B—Estimate 100–1,000 acres in state. Patch sizes may reach 20–60 acres.

Concept: This community is a temperate deciduous maritime shrubland, generally occurring on the lee side of sand dunes. Although placed within the shrubland class, the physiognomy of this vegetation is very variable and ranges from open woodland to stunted forest to dense nearly impenetrable thicket (this association was previously placed in the forest class). Individual trees tend to be wind-pruned and multiple-stemmed. The vegetation is characterized by *Prunus serotina, Amelanchier canadensis, Pinus taeda, Photinia pyrifolia (= Aronia arbutifolia)*, and *Sassafras albidum* in varying proportions. *Morella cerifera (= Myrica cerifera)* may form a subcanopy, but if the community is particularly stunted, this species may contribute substantially to the canopy as well. As with other communities in this alliance, the *Prunus serotina / Morella cerifera / Smilax rotundifolia* Shrubland (CEGL006319) supports a number of vines in great abundance, such as *Smilax rotundifolia, Smilax glauca, Parthenocissus quinquefolia*, and *Toxicodendron radicans*. Herbs are generally scarce to lacking entirely, and when present are generally made up of tree and vine seedlings. This community occurs on the coast and is subject to salt spray and winds. Occurrences on barrier islands and on dunes of the mainland exhibit wind-pruning. The substrate varies from pure sand directly adjacent to the ocean to loamy sands in more sheltered areas of the coast.
Comments:
Range:
Other States/Provinces: DE:S?, MD:S?, VA:S?
Physiographic Province, Section, Subsection: 232Ac:CCC, 232B:CC, 232C:CC
Synonymy:
References: Bellis 1992, Boule 1979, Dunlop and Crow 1985, Higgins et al. 1971, Hill 1986, Sneddon et al. 1994, Stalter 1979
Authors: ECS **Confidence:** 2 **Identifier:** CEGL006319

III.B.2.N.a.13. QUERCUS ILICIFOLIA SHRUBLAND ALLIANCE
Bear Oak Shrubland Alliance

Concept: This alliance includes shrublands dominated by *Quercus ilicifolia*. Associations in this alliance occur as dense shrub thickets on sandy soils or rock outcrops/summits. This alliance in known from the northern Appalachians.
Comments:
Range: This alliance is found in Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Virginia, and West Virginia.
Other States/Provinces: CT MA ME NH NJ NY PA RI VA WV
Physiographic Province, Section, Subsection: 212:C, 221:C, **232A:**CC, M221Aa:CCP, M221Ab:CCP, M221Ac:CCC, M221Da:CCC
Synonymy: Bear Oak: 43 (Eyre 1980)
References: Eyre 1980
Authors: D.J. ALLARD, KP, ECS **Identifier:** A.906

QUERCUS ILICIFOLIA SHRUBLAND [PLACEHOLDER]
Bear Oak Shrubland

G?
S1 01-08-16

State Estimated EO's: B—Estimate 2–7 occurrences in state.
State Area: A—Less than 100 acres in state. Patch sizes range 1–5 acres.

Concept: Scrub oak-dominated shrub thickets of sandy soils or rocky summits or outcrops. Occurs as frost pockets in most pine barrens. This is a placeholder for associations to be developed.
Comments:
Range:
Other States/Provinces: CT:S?, MA:S?, ME:S?, NH:S?, NY:S?, PA:S?, RI:S?, VA:S?, WV:S?
Physiographic Province, Section, Subsection: 212:C, 221:C, **232A:**CC, M221Ac:CCC, M221Da:CCC
Synonymy: Scrub oak summits (CAP)
References: Conard 1935, Duppstadt 1972
Authors: ECS **Confidence:** 3 **Identifier:** CEGL003883

III.B.2.N.e. Seasonally flooded cold-deciduous shrubland

III.B.2.N.e.1. ALNUS INCANA SEASONALLY FLOODED SHRUBLAND ALLIANCE
Speckled Alder Seasonally Flooded Shrubland Alliance

Concept: This alliance occurs adjacent to streams, lakes, and seeps in the midwestern and western United States and southern Canada. The elevation of stands range from near sea level in the Midwest to 2800 m in Utah. In the Midwest, soils are wet, often mucks or peats. The water is non-stagnant, nutrient-rich, and often slightly calcareous. In the West, stands are located on active fluvial surfaces, floodplains and streambanks, along moderate to steep-gradient streams. Stands are found on well-aerated, alluvial soils that range in texture from silty loam to sandy loam. Some soils have a large percentage of coarse fragments in the upper horizons. Soils are wet throughout the growing season and are flooded during spring runoff. Tall shrubs (2–8 m) dominate stands, with a moderately open to dense shrub canopy. *Alnus incana* often forms a dense canopy, but in more open stands, other tall and short shrubs, such as *Cornus sericea, Ribes inerme, Ribes lacustre, Rosa woodsii, Rubus idaeus, Salix* spp., *Spiraea douglasii, Symphoricarpos* spp., and *Viburnum* spp. can be found. The herbaceous layer often has a rich diversity of species; the density of the layer varies inversely with the cover of the tall-shrub canopy. *Aconitum columbianum, Athyrium filix-femina, Calamagrostis canadensis, Caltha palustris, Carex* spp., *Equisetum arvense, Impatiens capensis, Lycopus uniflorus, Maianthemum stellatum, Symplocarpus foetidus, Thelypteris palustris*, and *Typha* spp. are common herbaceous associates. Trees are found in many stands of this alliance and can include *Acer rubrum, Fraxinus nigra, Picea pungens, Populus angustifolia*, and *Thuja occidentalis*.
Comments: In Ohio, this alliance sometimes merges with *Alnus serrulata* Seasonally Flooded Shrubland Alliance (A.994). With increasing tree canopy cover, this alliance can be similar to the *Thuja occidentalis* Saturated Forest Alliance (A.200) and *Fraxinus nigra—Acer rubrum* Saturated Forest Alliance (A.347).
Kartesz (1999) recognizes two subspecies, *Alnus incana ssp. tenuifolia* and *Alnus incana ssp. rugosa* for North America.
Range: This alliance is found in northern Indiana, northern Ohio, Michigan, northern Illinois, Iowa, Wisconsin, Minnesota, and North Dakota. It can also be found in Idaho,

Washington, Oregon, California, Utah, and Colorado, and in Canada in Ontario and southern Manitoba.

Other States/Provinces: BC? CA CO IA ID IL IN? MA MB? ME MI MN ND NH NJ NM? NY OH ON OR PA UT WA WI WY

Physiographic Province, Section, Subsection: 212Ha:CCP, 212Hb:CCP, 212He:CCP, 212Hh:CCP, 212Hi:CCP, 212Hj:CCP, 212Hk:CCP, 212Hl:CCC, 212Hm:CCP, 212Hn:CCP, 212Ho:CCP, 212Hp:CCP, 212Hq:CCC, 212Hr:CCP, 212Hs:CCP, 212Ht:CCC, 212Hu:CCP, 212Hv:CCP, 212Hw:CCP, 212Hx:CCP, 212Hy:CCP, 212Ib:CCC, 212Ja:CCP, 212Jb:CCP, 212Jc:CCP, 212Je:CCP, 212Jf:CCC, 212Jj:CCP, 212Jk:CCP, 212Jl:CCP, 212Jm:CCP, 212Jn:CCP, 212Jo:CCP, 212Jr:CCC, 212Ka:CCP, 212Kb:CCC, 212La:CCC, 212Lb:CCC, 212Lc:CCP, 212Ld:CCP, 212Ma:CPP, 212Mb:CPP, 212Na:CCC, 212Nb:CCP, 212Nc:CCC, 212Nd:CCP, 221:C, 222Je:CCC, 222Lb:CCC, 222Lc:CCC, 222Mc:CCC, 222Md:CCC, 222Na:CCC, 251Aa:CCC, 251Ab:CCC, M212:C, M242C:CC, M261A:CC, M261D:CC, M261E:CC, M331G:CC, M331H:CC, M332A:CC, M332F:CC, M332G:CC, M333A:CC, M333B:CC, M333D:CC, M341B:CC

Synonymy: *Alnus incana ssp. tenuifolia* Series, in part (Johnston 1987); Eastside midmontane *Alnus incana-Salix spp*. riparian shrublands, in part (Chappell et al. 1997); Alder Thicket (Curtis 1959); Thicket Swamp: Speckled Alder / Bluejoint Grass type (W35). northwestern Ontario (Harris et al. 1996); Northern Shrub Thicket. Michigan (Chapman et al. 1989); Alder Swamp. Minnesota (Minnesota Natural Heritage Program (MNNHP) 1993); Alder Shrub Swamp. Ohio (Anderson 1982)

References: Anderson 1982, Bunin 1975c, Bursik and Moseley 1995, Chapman et al. 1989, Chappell et al. 1997, Crowe and Clausnitzer 1997, Curtis 1959, Faber-Langendoen et al. 1996, Hansen et al. 1988a, Hansen et al. 1989, Harrington 1978, Harris et al. 1996, Hess 1981, Hitchcock et al. 1977a, Johnston 1987, Kartesz 1999, Kettler and McMullen 1996, Kittel and Lederer 1993, Kittel et al. 1994, Kittel et al. 1995, Kittel et al. 1999, Komarkova 1986, Kovalchik 1987, Kovalchik 1993, Minnesota Natural Heritage Program (MNNHP) 1993, Padgett et al. 1988b, Padgett et al. 1989, Richard et al. 1996, Vestal 1917, Vestal 1919, Walker 1962, Welsh et al. 1987

Authors: M. DAMM, WCS **Identifier:** A.986

ALNUS INCANA SWAMP SHRUBLAND
Speckled Alder Swamp Shrubland
[Speckled Alder Swamp]

G5? 96-10-03
S2S4 01-08-16

State Estimated EO's: BD—Estimate 20–>100 occurrences.
State Area: U—Patch sizes may get as large as 50–100 acres.

Concept: This alder swamp community type is widespread in the midwestern and northeastern United States and southern Canada. Stands occur on shores, edges of beaver meadows in stream floodplains, swales associated with small streams in peatlands or upland forests. Soils are well-decomposed peat or mineral soils. Hydrology is typically seasonally flooded to saturated. The vegetation is dominated by tall shrubs, 2-8 m tall, with a moderately open to dense shrub canopy. There is an understory of shorter shrubs and herbaceous species. The density of the understory varies inversely with the tall-shrub canopy. The overstory is usually overwhelmingly dominated by *Alnus incana*, but where it is not as dominant, other shrubs, such as *Cornus sericea, Rubus idaeus, Salix* spp., *Spiraea alba*, and *Viburnum* spp., can be found. The herbaceous layer contains species such as *Symphyotrichum lanceolatum var. lanceolatum (= Aster simplex), Calamagrostis canadensis, Caltha palustris, Carex lacustris, Carex prairea, Eupatorium maculatum, Impatiens capensis, Lycopus uniflorus, Scirpus atrovirens, Symplocarpus foetidus, Thelypteris palustris*, and *Typha* spp. Mosses include

Climacium dendroides. Where the tall-shrub canopy is open, the graminoids can become dense. Trees are found in many stands, including *Acer rubrum, Fraxinus nigra*, and *Thuja occidentalis*.

Comments: Type has a very broad distribution and there may be a need to separate a northern (more boreal) type from a southern (more temperate) type based on floristic differences. Hydrology may be quite variable, ranging from temporarily flooded to semipermanently flooded. In Ohio, this association sometimes merges with *Alnus serrulata* stands in *Alnus serrulata* Eastern Shrubland (CEGL005082). With increasing tree canopy cover, this association can be similar to *Larix laricina* forest types, *Thuja occidentalis* saturated forest types, and *Fraxinus nigra—Acer rubrum* saturated forest types.

Range: This alder swamp community type is widespread in the midwestern and northeastern United States and southern Canada, ranging from Maine west to Manitoba, south to Iowa, and east to New Jersey.

Other States/Provinces: IA:S3?, IL:S?, IN?, MA:S?, MB?, ME:S?, MI:S5, MN:S5, ND:S2?, NH:S?, NY:S?, OH:S?, ON:S?, PA:S?, WI:S4

Physiographic Province, Section, Subsection: 212Ha:CCP, 212Hb:CCP, 212He:CCP, 212Hh:CCP, 212Hi:CCP, 212Hj:CCP, 212Hk:CCP, 212Hl:CCC, 212Hm:CCP, 212Hn:CCP, 212Ho:CCP, 212Hp:CCP, 212Hq:CCC, 212Hr:CCP, 212Hs:CCP, 212Ht:CCC, 212Hv:CCP, 212Hw:CCP, 212Hy:CCP, 212Ib:CCC, 212Ja:CCP, 212Jb:CCP, 212Jc:CCP, 212Je:CCP, 212Jf:CCC, 212Jj:CCP, 212Jk:CCP, 212Jl:CCP, 212Jm:CCP, 212Jn:CCP, 212Jo:CCP, 212Jr:CCC, 212Ka:CCP, 212Kb:CCC, 212La:CCC, 212Lb:CCC, 212Mb:CPP, 212Na:CCC, 212Nb:CCP, 212Nc:CCC, **221:**C, 222Je:CCC, 222Lb:CCC, 222Lc:CCC, 222Mc:CCC, 222Md:CCC, 222Na:CCC, 251Aa:CCC, 251Ab:CCC, M212:C

Synonymy: Alder Thicket (Curtis 1959) =, Thicket Swamp: Speckled Alder / Bluejoint Grass type , W35 (Harris et al. 1996) =, Alder Shrub Swamp (Anderson and Barren 1991) =

References: Anderson 1982, Anderson and Barren 1991, Chapman et al. 1989, Curtis 1959, Harris et al. 1996, Minnesota Natural Heritage Program (MNNHP) 1993, Ohmann and Ream 1971

Authors: D. Faber-Langendoen, MCS **Confidence:** 3 **Identifier:** CEGL002381

III.B.2.N.e.25. MORELLA (CERIFERA, PENSYLVANICA)—VACCINIUM FORMOSUM SEASONALLY FLOODED SHRUBLAND ALLIANCE

(Wax-myrtle, Northern Bayberry)—Southern Highbush Blueberry Seasonally Flooded Shrubland Alliance

Concept:
Comments:
Range:
Other States/Provinces: DE MD NJ
Physiographic Province, Section, Subsection: 232A:CC, 232B:CP, 232C:C?
Synonymy:
References:
Authors: ECS **Identifier:** A.1010

MORELLA (CERIFERA, PENSYLVANICA)—VACCINIUM FORMOSUM SHRUBLAND

(Wax-myrtle, Northern Bayberry)—Southern Highbush Blueberry Shrubland

G?

S1S2 01-08-16

State Estimated EO's: B—Estimate 6–15 occurrences in state.
State Area: B—Estimate between 150–300 acres in state. Patch sizes range 1–20 acres.

Concept: This shrub bog community of Maryland, Delaware, and New Jersey occurs in interdunal depressions of barrier island dunes. This community is a relatively open,

short-statured shrub wetland. The two most characteristic shrubs are *Morella cerifera (= Myrica cerifera)* and *Vaccinium formosum*. *Rosa palustris* and *Morella pensylvanica (= Myrica pensylvanica)* are two other common shrub associates. *Panicum virgatum, Andropogon virginicus* and other grasses are common. Other herbs include *Juncus canadensis, Juncus scirpoides, Juncus dichotomus, Pluchea foetida, Triadenum virginicum, Drosera intermedia, Lycopodiella appressa, Xyris torta*, and *Osmunda regalis*.

Comments:

Range:

Other States/Provinces: DE:S?, MD:S?

Physiographic Province, Section, Subsection: 232A:CC, 232B:CP, 232C:C?

Synonymy:

References: Clancy 1993, Higgins et al. 1971, Hill 1986, Martin 1959b, McAvoy and Clancy 1994, The Nature Conservancy (TNC) 1995c

Authors: ECS **Confidence:** 2 **Identifier:** CEGL003906

III.B.2.N.e.7. VACCINIUM FORMOSUM—VACCINIUM FUSCATUM SEASONALLY FLOODED SHRUBLAND ALLIANCE

Southern Highbush Blueberry—Black Highbush Blueberry Seasonally Flooded Shrubland Alliance

Concept: Depressional wetlands in uplands of the Coastal Plain and extreme lower Piedmont dominated by *Vaccinium formosum, Vaccinium fuscatum*, and other heaths locally, such as *Lyonia ligustrina var. foliosiflora, Lyonia lucida*, and others. Other shrub/vine species which may be present include *Leucothoe racemosa, Smilax walteri*, and *Viburnum nudum var. nudum*. The shrub coverage sometimes has an open, sparse structure. Trees may be interspersed among the shrubs; these may include *Liquidambar styraciflua, Acer rubrum var. rubrum, Pinus palustris*, and *Pinus taeda*. Herbaceous species that may be present include *Carex crinita, Carex glaucescens, Eleocharis* sp., *Rhynchospora* sp., *Scleria* sp., and *Utricularia gibba*. *Sphagnum* spp. are present in some examples. *Vaccinium* spp. sometimes exceed 5 m in height, but are placed here.

Comments:

Range: This alliance is found in uplands of the coastal plain and extreme lower Piedmont from New England to the Carolinas.

Other States/Provinces: CT DE MA MD NC NJ NY RI SC VA

Physiographic Province, Section, Subsection: 231Af:CCC, 232Ch:CCC

Synonymy: Small Depression Pond (Schafale and Weakley 1990); Upland Pool (Schafale and Weakley 1990)

References: Schafale and Weakley 1990

Authors: A.S. WEAKLEY, MP, SCS **Identifier:** A.992

VACCINIUM CORYMBOSUM—RHODODENDRON VISCOSUM—CLETHRA ALNIFOLIA SHRUBLAND

Highbush Blueberry—Swamp Azalea—Coastal Sweet-pepperbush Shrubland

G? 98-04-14
S1S3? 01-08-16

State Estimated EO's: AC—Estimate between 5–100 occurrences.

State Area: U—Probably less than 2000 acres in state. Patch sizes probably range from 1/4–20 acres.

Concept: Shrub swamp of seasonally flooded basins with shallow organic accumulation over sands. Characteristic species are *Vaccinium corymbosum, Clethra alnifolia* and *Chamaedaphne calyculata*. Other associates include *Rhododendron viscosum, Ilex glabra, Leucothoe racemosa, Lyonia ligustrina, Decodon verticillatus, Cephalanthus occidentalis, Kalmia angustifolia, Myrica gale, Photinia* spp. (= *Aronia* spp.), and *Woodwardia virginica*. *Sphagnum*

viridum and other *Sphagnum* mosses are also characteristic, forming a shallow mat over mineral soils. This vegetation often occurs on the margins of Coastal Plain ponds.

Comments:
Range:
Other States/Provinces: CT:S?, DE?, MA:S?, NY:S?, RI:S?
Physiographic Province, Section, Subsection: 232Ab:CCP, 232Ac:CCC
Synonymy:
References:
Authors: ECS **Confidence:** 2 **Identifier:** CEGL006371

III.B.2.N.g. Saturated cold-deciduous shrubland

III.B.2.N.g.8. BETULA PUMILA—(SALIX SPP.) SATURATED SHRUBLAND ALLIANCE
Bog Birch—(Willow species) Saturated Shrubland Alliance

Concept: This alliance, found in the northeastern and midwestern United States and south-central Canada, is composed of poor and moderately rich shrub fens. Shrubs less than 2 m tall and graminoids comprise the majority of the vegetation. Short trees are found in some stands. *Betula pumila, Dasiphora fruticosa ssp. floribunda (= Pentaphylloides floribunda), Salix discolor, Salix petiolaris*, and other *Salix* spp. are found throughout this alliance's range. In the northern part of its range, *Andromeda polifolia, Chamaedaphne calyculata*, and *Vaccinium oxycoccos* can be common in poor fen examples. Typical graminoids include *Calamagrostis canadensis, Carex* spp. (including *Carex pellita (= Carex lanuginosa), Carex lasiocarpa, Carex interior, Carex nebrascensis*, and *Carex oligosperma*), and *Eriophorum* spp. Some of the forbs of this alliance include *Doellingeria umbellata (= Aster umbellatus), Euthamia graminifolia, Eleocharis* spp., *Menyanthes trifoliata* (in the North), *Sarracenia purpurea*, and *Thelypteris palustris*. *Sphagnum* spp. are ubiquitous in this alliance. When trees do occur, they are almost always *Larix laricina* and *Picea mariana* in the North and *Fraxinus pennsylvanica* in the Great Plains. Other tree species may be found in stands further east.

This alliance is found where surface waters are slightly acidic to slightly alkaline with moderate nutrient levels. It is usually on peat but can be on mineral soils. The soil is saturated for much of the year and may flood periodically. In Nebraska, Tolstead found the water table to be within 15-30 cm and flooding to be less than 2 m deep.

Comments: Some stands of this alliance may appear similar to some of the bog vegetation types; however, this alliance contains minerotrophic indicators such as *Betula pumila*. It is possible that the poor fens, where *Chamaedaphne calyculata* and other ericaceous shrubs are codominant with *Betula pumila*, may better fit with the *Chamaedaphne calyculata* Saturated Dwarf-shrubland Alliance (A.1092).

Range: This alliance is found in the Midwest in Indiana, Michigan, Wisconsin, Minnesota, Iowa, central Nebraska, South Dakota, and North Dakota. It can also be found in Maine and in Ontario and Manitoba, Canada.

Other States/Provinces: CT IA IN MA? MB ME? MI MN ND NJ NY? ON QC? SD WI

Physiographic Province, Section, Subsection: 212Hb:CC?, 212He:CC?, 212Hh:CCP, 212Hj:CCC, 212Hl:CCC, 212Hm:CCP, 212Ho:CCP, 212Hp:CCP, 212Hq:CCP, 212Hy:CCP, 212Ja:CCP, 212Jc:CCP, 212Jh:CCC, 212Jj:CCP, 212Jl:CCP, 212Jm:CCC, 212Ka:CC?, 212Kb:CCC, 212La:CCC, 212Lb:CC?, 212Lc:CCP, 212Ld:CCP, 212Ma:CCP, 212Mb:CCC, 212Na:CCC, 212Nb:CCP, 212Nc:CCC, 212Nd:CC?, **221Ae:**CPP, **221Ba:**CCC, 222Ka:CCC, 222Kf:CCC, 222Ma:CCC, 222Mc:CCC, 222Md:CCC, 222Na:CCC, 251Aa:CCC, 251Ab:CCC, 331F:??, 332C:CC

Synonymy: Plants of Peat Soils. central Nebraska (Tolstead 1942); Moderately Rich Fen: Tamarack—Black Spruce / Ericaceous Shrub (W18). northwestern Ontario (Harris et al.

1996); Poor Fen: Ericaceous Shrub / Wire Sedge / Sphagnum (W20) (Harris et al. 1996); Poor Fen: Ericaceous Shrub / Sphagnum (W21) (Harris et al. 1996); Poor Fen: Black Spruce—Tamarack / Ericaceous Shrub / Sphagnum (W22) (Harris et al. 1996); Fen. Wisconsin (Curtis 1959)

References: Curtis 1959, Faber-Langendoen et al. 1996, Harris et al. 1996, Minnesota Natural Heritage Program (MNNHP) 1993, Tolstead 1942

Authors: MCS **Identifier:** A.1021

BETULA PUMILA—TOXICODENDRON VERNIX—DASIPHORA FRUTICOSA SSP. FLORIBUNDA SHRUBLAND

Bog Birch—Poison-sumac—Shrubby-cinquefoil Shrubland

[Shrub Carr] **G2G3** 98-01-23
S2S3 01-08-16

State Estimated EO's: BC—Estimate 6–30 occurrences.

State Area: A—Estimate 60–200 acres in state. Patch sizes range .25–20 acres.

Concept: This shrub fen association is characterized by a dense mixture of 1.5–2 m tall shrubs in deep muck, often in standing water 6 inches or more deep, in limestone regions of Lower New England / Northern Piedmont. This association is most typically found on lakeshores but may also be found at streamsides. Characteristic shrubs are *Betula pumila, Salix candida, Toxicodendron vernix, Rosa palustris, Alnus incana, Alnus serrulata, Viburnum dentatum, Viburnum nudum, Viburnum lentago, Viburnum opulus var. americanum (= Viburnum trilobum)*, as well as *Dasiphora fruticosa ssp. floribunda (= Pentaphylloides floribunda)* reaching 1 m in height. Herbaceous associates are few and sparsely distributed, and include *Galium trifidum, Carex stricta, Carex lacustris, Campanula aparinoides*, and *Lysimachia thyrsiflora*. Scattered individuals of *Acer rubrum* saplings are also typical.

Comments:

Range:

Other States/Provinces: CT:S?, MA?, NY?

Physiographic Province, Section, Subsection: 221Ae:CPP, **221Ba:**CCC

Synonymy:

References:

Authors: ECS **Confidence:** 2 **Identifier:** CEGL006360

III.B.2.N.g.3. CORNUS SERICEA—PHOTINIA MELANOCARPA—TOXICODENDRON VERNIX SATURATED SHRUBLAND ALLIANCE

Red-osier Dogwood—Black Chokeberry—Poison-sumac Saturated Shrubland Alliance

Concept: This shrub fen alliance occurs between the Ohio River and the southern Great Lakes. The vegetation is dense and dominated by shrubs, although herbaceous species are also abundant. Dominant shrubs are *Alnus incana, Photinia melanocarpa (= Aronia melanocarpa), Cornus* spp. (e.g., *Cornus amomum, Cornus obliqua*, and *Cornus sericea), Dasiphora fruticosa ssp. floribunda (= Pentaphylloides floribunda), Rhamnus lanceolata, Salix discolor*, and *Viburnum lentago*. Common herbaceous species include *Carex* spp., *Cypripedium reginae, Filipendula rubra, Schoenoplectus tabernaemontani (= Scirpus tabernaemontani), Solidago patula*, and *Thelypteris palustris*. Stands that are more prairie-like also contain *Andropogon gerardii, Silphium terebinthinaceum*, and *Sorghastrum nutans*. Peat forms in some stands.

Stands of this alliance occur where calcareous groundwater seeps to the surface, often at the base of gravelly moraines or other glacial features. These sites are gently to moderately sloping. The minerals that are in the groundwater often form areas of marl.

Comments:
Range: This alliance is found in Ohio, Indiana, and Illinois.
Other States/Provinces: CT? IL IN MA? MI? NJ NY OH ON PA WI
Physiographic Province, Section, Subsection: 212Ea:CCC, 212Ee:CCC, **221Ae:**CCC, **221Ba:**CCC, 222Ha:CCC, 222Hb:CCC, 222Ib:CCC, 222Ic:CCC, 222Ie:CCC, 222Jb:CCC, 222Jh:CCC, 222Ji:CCC, 222Kf:CCC, 222Kg:CCC, 222Kj:CC?, 251Cf:CCC, 251Dd:C??, M221:P
Synonymy:
References: Anderson 1982, Faber-Langendoen et al. 1996, White and Madany 1978
Authors: MCS **Identifier:** A.1016

CORNUS AMOMUM—SALIX CANDIDA / DASIPHORA FRUTICOSA SSP. FLORIBUNDA / CAREX STRICTA SHRUBLAND
Silky Dogwood—Hoary Willow / Shrubby-cinquefoil / Tussock Sedge Shrubland [Calcareous Fen]
G3? 98-01-23
S2S3 01-08-16

State Estimated EO's: C—Estimate 20–60 occurrences.
State Area: B—Estimate 140–200 acres in state. Patch sizes range from .25–20 acres.

Concept: This calcareous fen shrubland is characterized by hummocky microtopography and dense patches of shrubs with small interspersed graminoid openings. *Cornus amomum, Cornus sericea*, and *Salix* spp. (*Salix candida, Salix petiolaris, Salix serissima*, and *Salix discolor*) are dominant and very characteristic of this association. Other shrubs include *Dasiphora fruticosa ssp. floribunda (= Pentaphylloides floribunda), Alnus incana, Toxicodendron vernix*, and *Viburnum dentatum*. *Carex stricta* is the dominant and characteristic sedge; other herbaceous associates include *Eupatorium maculatum, Solidago patula, Solidago uliginosa, Spiranthes cernua, Trollius laxus, Thelypteris palustris, Muhlenbergia glomerata, Parnassia glauca, Drosera rotundifolia, Carex lacustris, Ludwigia palustris*, and *Deschampsia caespitosa*. *Juniperus virginiana* occurs as scattered individuals and is characteristic of this association in New Jersey.
Comments:
Range: This association is currently documented from New Jersey only, but is suspected to occur in Pennsylvania, New Jersey, Massachusetts, Connecticut, and New York.
Other States/Provinces: CT?, MA?, NY?, PA:S?
Physiographic Province, Section, Subsection: 221Ae:CCC, **221Ba:**CCC
Synonymy:
References:
Authors: ECS **Confidence:** 2 **Identifier:** CEGL006359

III.B.2.N.g.5. VACCINIUM CORYMBOSUM SATURATED SHRUBLAND ALLIANCE
Highbush Blueberry Saturated Shrubland Alliance

Concept: This alliance, found in the eastern Midwest and northeastern United States and probably many of the eastern Canadian provinces, contains tall-shrub swamps dominated by *Vaccinium corymbosum*. Further work is needed to characterize this alliance.

These tall shrublands can occur at margins of kettles in glaciated regions, and in basins or at the heads of streams throughout the range. Soils are usually deep peats or mucks, and the water is often acidic.

Comments:
Range: This alliance is found in the East in Connecticut, Massachusetts, New Hampshire, New York, Pennsylvania, and Rhode Island, in the Midwest in Ohio; and in Canada, in Ontario and probably other eastern provinces. This alliance may also be found in Vermont (?), Indiana (?), and Michigan (?).
Other States/Provinces: CT IN MA ME MI? NH NJ NY OH ON PA RI VT?
Physiographic Province, Section, Subsection: 212Ed:CPP, 212Fa:CCP, 212Fb:CCP, 212Fc:CCP, 212Fd:CCP, 212Ga:CCP, 212Gb:CC?, 221Aa:CCP, 221Ab:CCP, 221Ac:CCP, 221Ad:CCP, **221Ae:**CCP, 221Af:CCP, 221Ag:CCP, 221Ah:CCP, 221Ai:CCP, 221Aj:CCP, 221Ak:CCP, 221Al:CCP, **221Am:**CCP, **221Ba:**CCP, 221Bc:CCP, **221Bd:**CCP, **221Da:**CPP, **221Dc:**CPP, 221Fa:CCC, 221Fc:CCC, 222Ia:CC?, 222Ib:CCP, 222Ic:CCP, 222Id:CC?, 222Ie:CCC, 222If:CC?, 222Jc:CCC, 222Jh:CCC, 222Ji:CCC, 232Aa:PPP, **232Ac:**PPP, 232Bb:P??, M212Ad:P??, M212Ba:PPP, M212Bb:PPP, M212Ca:PPP, M212Cc:PPP, M212Cd:PPP, M212Dc:PPP, M212Eb:P??, M212Fb:P??, M221Aa:CCP, M221Ac:CCC, M221Bb:CCC, M221Bf:CCC, M221Da:CCC
Synonymy:
References: Faber-Langendoen et al. 1996
Authors: ECS **Identifier:** A.1018

VACCINIUM CORYMBOSUM / SPHAGNUM SPP. SHRUBLAND
Highbush Blueberry / Peatmoss species Shrubland
[Highbush Blueberry Bog Thicket] **G3G5** 97-12-31
S1S3 01-08-16

State Estimated EO's: AC—Estimate between 5–50 occurrences in state.
State Area: U—Estimate between 200–2,000 acres in state. Patch size probably ranges from 1/4–100 acres.

Concept: Highbush blueberry peat bog of glaciated Northeast, including Lower New England, North Atlantic Coast, and parts of the High Alleghenies. 1998 (DFL): This community is found in acidic peats or mucks and dominated by tall, deciduous, ericaceous shrubs and peatmosses. The water is usually nutrient-poor and acidic (pH <5). The tall-shrub layer is dominated by *Vaccinium corymbosum*, sometimes codominant with *Rhododendron viscosum*. Other associated shrubs include *Photinia melanocarpa (= Aronia melanocarpa), Gaylussacia baccata, Ilex verticillata, Nemopanthus mucronatus*, and *Rhododendron canadense*. Characteristic herbs include *Carex trisperma, Osmunda cinnamomea, Sarracenia purpurea*, and *Maianthemum trifolium (= Smilacina trifolia)*. Characteristic peatmosses include *Sphagnum centrale, Sphagnum fimbriatum, Sphagnum magellanicum*, and *Sphagnum capillifolium (= Sphagnum nemoreum)*. Stunted trees may be present at a low density and less than 25% cover, including *Acer rubrum*.
Comments:
Range:
Other States/Provinces: CT:S?, MA:S?, ME:S?, NH:S?, NY:S?, PA:S?, RI:S?, VT?
Physiographic Province, Section, Subsection: 212F:CC, 212G:CC, 221A:CC, **221B:**CC, M221Ac:CCC, M221Bb:CCC, M221Bf:CCC, M221Da:CCC
Synonymy: Highbush blueberry shrub swamp (CAP)
References: Conard 1935, Damman and French 1987, Johnson 1981b, Lynn and Karlin 1985, Metzler and Barrett 1982, Rozsa and Metzler n.d.
Authors: ECS **Confidence:** 2 **Identifier:** CEGL006190

III.B.2.N.h. Tidal cold-deciduous shrubland

III.B.2.N.h.2. ALNUS (INCANA, SERRULATA) TIDAL SHRUBLAND ALLIANCE

(Speckled Alder, Smooth Alder) Tidal Shrubland Alliance

Concept: Tidal freshwater, or perhaps also oligohaline, shrublands dominated by *Alnus serrulata* and/or *Alnus incana*. In some examples one or both of these may be characteristically dominant or nearly so. Other examples may be more semi-open with a mixed canopy of *Alnus* with other shrubs such as *Cornus amomum, Rosa palustris*, and *Ilex verticillata*. Other woody plants which may be present include *Sambucus canadensis, Salix* spp., *Amorpha fruticosa, Cephalanthus occidentalis*, and *Toxicodendron radicans*. More northern examples may contain *Viburnum recognitum* and *Spiraea alba var. latifolia (= Spiraea latifolia)*. This alliance occurs along tidal freshwater reaches of rivers. One association is recognized along the south Atlantic Coast to South Carolina and possibly elsewhere. This can occur as a fringing shrubland, zonal between *Zizania aquatica* tidal marshes and tidal cypress—gum forests. Less commonly it occupies large patches in freshwater marshes. Other species characteristic of tidal situations often occur, including *Rosa palustris* and *Zizania aquatica*. Another association is recognized in coastal areas with tidally influenced river systems from Maine to Virginia. Flood waters are typically slightly acid (pH less than 5) and soils are usually mineral without significant peat deposits. In these examples, *Carex stricta* may also be present and there is a great deal of micro-relief (tussocks and furrows) leading to high species diversity. Some shrub associates include *Decodon verticillatus* and *Toxicodendron vernix*; some herbaceous associates are *Osmunda regalis, Thelypteris palustris, Galium* spp., *Typha latifolia, Peltandra virginica, Mikania scandens, Symphyotrichum novi-belgii (= Aster novi-belgii), Boehmeria cylindrica, Impatiens capensis, Triadenum walteri, Asclepias incarnata, Carex emoryi, Carex atlantica ssp. atlantica (= Carex incomperta), Eriophorum virginicum, Platanthera clavellata*, and *Xyris torta*.

Comments:

Range: This alliance is found in Georgia, South Carolina, Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Virginia, and possibly Florida (?), North Carolina (?), and others.

Other States/Provinces: CT DE FL? GA MA MD ME NC? NH NJ NY PA RI SC VA

Physiographic Province, Section, Subsection: 221Aa:CCP, 221Ab:CCP, 221Ac:CCC, 221Ad:CCC, 221Ak:CCC, 232Aa:CCP, **232Ab:**CCC, **232Ac:**CCC, 232Ad:CCC, 232Bt:CCC, 232Bx:CCC, 232Bz:CCC, 232Cb:CCC, 232Ce:CCC, 232Ch:CC?, 232Ci:CC?

Synonymy:

References: Sneddon et al. 1996

Authors: A.S. WEAKLEY, MOD. L.A. S, KP, SCS **Identifier:** A.1024

ALNUS (INCANA SSP. RUGOSA, SERRULATA)—CORNUS AMOMUM SHRUBLAND

(Speckled Alder, Smooth Alder)—Silky Dogwood Shrubland

G? 97-08-15
S? 01-08-16

State Estimated EO's: ?—Not yet ranked in New Jersey.

State Area:

Concept: Tidal freshwater, or perhaps also oligohaline, shrublands dominated by *Alnus serrulata* and/or *Alnus incana ssp. rugosa*. In some examples one or both of these may be characteristically dominant or nearly so. Other examples may be more semi-open with a mixed canopy of *Alnus* with other shrubs such as *Cornus amomum, Rosa palustris*, and *Ilex verticillata*. Other woody plants which may be present include *Sambucus canadensis, Salix* spp., *Amorpha fruticosa, Cephalanthus occidentalis*, and *Toxicodendron radicans*. More

northern examples may contain *Viburnum recognitum* and *Spiraea alba var. latifolia (= Spiraea latifolia)*. This association is found in coastal areas with tidally influenced river systems from Maine to Virginia. Flood waters are typically slightly acid (pH less than 5) and soils are usually mineral without significant peat deposits. *Carex stricta* may also be present and there is a great deal of micro-relief (tussocks and furrows) leading to high species diversity. Some shrub associates include *Decodon verticillatus* and *Toxicodendron vernix*; some herbaceous associates are *Osmunda regalis var. spectabilis, Thelypteris palustris var. pubescens, Galium* spp., *Typha latifolia, Peltandra virginica, Mikania scandens, Symphyotrichum novi-belgii (= Aster novi-belgii), Boehmeria cylindrica, Impatiens capensis, Triadenum walteri, Asclepias incarnata, Carex emoryi, Carex atlantica (= Carex incomperta), Eriophorum virginicum, Platanthera clavellata*, and *Xyris torta*.

Comments:

Range:

Other States/Provinces: CT:S?, DE:S?, MA:S?, MD:S?, ME:S?, NH:S?, NY:S?, PA:S?, RI:S?, VA:S?

Physiographic Province, Section, Subsection: 221Aa:CCP, 221Ab:CCP, 221Ac:CCC, 221Ad:CCC, 221Ak:CCC, 232Aa:CCP, **232Ab:**CCC, **232Ac:**CCC, 232Ad:CCC, 232Bt:CCC, 232Bx:CCC, 232Bz:CCC

Synonymy:

References: Sneddon et al. 1996

Authors: ECS **Confidence:** 2 **Identifier:** CEGL006337

III.B.2.N.h.1. BACCHARIS HALIMIFOLIA—IVA FRUTESCENS TIDAL SHRUBLAND ALLIANCE

Groundsel-tree—Maritime Marsh-elder Tidal Shrubland Alliance

Concept: This alliance includes maritime scrub communities typically dominated by *Iva frutescens* or *Baccharis halimifolia* or both, growing in association with salt marshes. These communities occur primarily in estuarine margin situations, especially on the sound sides of barrier islands. Characteristically, these communities form an ecotone between salt marsh and upland vegetation or in areas within the salt marsh having slightly higher elevations and lower salinity levels than the surrounding marsh. Storm-induced disturbance causes periodic die-back of the shrubs restricting the extent of their spread. Characteristic species include *Baccharis halimifolia, Iva frutescens, Rosa carolina, Spartina patens*, and *Panicum virgatum*.

Comments:

Range: This alliance is found in Alabama, Florida, Georgia, Louisiana (?), Mississippi, North Carolina, South Carolina, Texas, Connecticut, Delaware, Massachusetts, Maine, Maryland, New Hampshire, New Jersey, New York, Rhode Island, and Virginia.

Other States/Provinces: AL CT DE FL GA LA MA MD ME MS NC NH NJ NY RI SC TX VA

Physiographic Province, Section, Subsection: 212P:PP, 221Aa:CCC, 221Ab:CCC, 221Ac:CCC, 221Ad:CCC, **221Ae:**CCP, 221Aj:CC?, 221Ak:CCC, **221Dc:**CPP, 231Fb:CCC, 232Aa:CCC, **232Ab:**CCC, **232Ac:**CCC, 232Ad:CC?, 232Bb:CC?, 232Bc:CCP, 232Bd:CCP, 232Br:CCP, 232Bz:CCC, 232Ce:CCC, 232Ch:CCC, 232Ci:CCC, 232Dc:CCC, 232Eb:CCC, 255Dc:CCC

Synonymy: Tidal Marsh, in part (Florida Natural Areas Inventory 1992a); Salt Shrub, in part (Schafale and Weakley 1990); Shrub succession community, in part (Higgins et al. 1971); Salt marsh community, in part (Hill 1986); Swamp thicket, in part (Klotz 1986); salt marsh and upper border (Barry 1980); salt grass—marsh elder savanna (Martin 1959b); saltbush zone (Boule 1979); Estuarine scrub-shrub wetland (Tiner 1985b); Salt bush—salt meadow marsh (Daiber et al. 1976); *Iva frutescens-Baccharis halimifolia* (Good 1965); *Iva frutescens* (Klemas et al. 1973); *Baccharis halimifolia* (Klemas et al. 1973); Salt shrub (Reschke 1990); Salt marsh complex, marsh-upland border (Breden 1989)

References: Au 1974, Barry 1980, Boule 1979, Breden 1989, Daiber et al. 1976, Florida Natural Areas Inventory 1992a, Florida Natural Areas Inventory 1992b, Good 1965, Higgins et al. 1971, Hill 1986, Hillestad et al. 1975, Hosier 1975, Klemas et al. 1973, Klotz 1986, Martin 1959b, Nelson 1986, Reschke 1990, Schafale and Weakley 1990, Tiner 1977, Tiner 1985b, Wharton 1978, Wolfe 1990
Authors: D.J. ALLARD, MOD. A.S. WE, JT, ECS **Identifier:** A.1023

BACCHARIS HALIMIFOLIA—IVA FRUTESCENS / PANICUM VIRGATUM SHRUBLAND
Groundsel-tree—Maritime Marsh-elder / Switchgrass Shrubland

G5
S? 01-08-16

State Estimated EO's: ?—Not yet ranked in New Jersey.
State Area:

Concept: This salt shrub community of the Atlantic coast occurs on the high salt marsh—upland ecotone. The substrate is characterized by peat overtopping sand or sand and gravel. The shrub layer is dominated by *Iva frutescens* and *Baccharis halimifolia*. The herbaceous layer is relatively diverse and includes *Panicum virgatum, Limonium carolinianum, Solidago sempervirens, Plantago maritima var. juncoides*, and *Salicornia* spp. This association is differentiated from the *Baccharis halimifolia—Iva frutescens ssp. oraria / Spartina patens* Shrubland (CEGL003921) by the relatively greater species diversity and relatively abrupt transition from salt marsh to upland.
Comments:
Range:
Other States/Provinces: CT:S?, DE:S?, MA:S?, MD:S?, ME:S?, NH:S?, NY:S?, RI:S?, VA?
Physiographic Province, Section, Subsection: 212P:PP, 221Aa:CCC, 221Ab:CCC, 221Ac:CCC, 221Ad:CCC, 221Ak:CCC, 232Aa:CCC, **232Ab:**CCC, 232Bz:CCC, 232Ch:CCC
Synonymy:
References:
Authors: ECS **Confidence:** 2 **Identifier:** CEGL006063

BACCHARIS HALIMIFOLIA—IVA FRUTESCENS SSP. ORARIA / SPARTINA PATENS SHRUBLAND
Groundsel-tree—Northern Maritime Marsh-elder / Saltmeadow Cordgrass Shrubland
[Salt Shrub]

G5
S2S3 01-08-16

State Estimated EO's: C
State Area: B—200-500 acres total; 5–150 acres patch size

Concept: This maritime shrubland of the mid-Atlantic states occurs in association with salt marshes. In its natural condition, this community forms the border of the salt marsh between the high salt marsh and adjacent upland vegetation. It also occurs in patches on areas of slightly higher elevation within the salt marsh or on spoil mounds adjacent to ditches. *Baccharis halimifolia* and *Iva frutescens* are the most characteristic shrub species. Other associated shrubs include *Morella pensylvanica (= Myrica pensylvanica)* in the northern portion of the range, while *Borrichia frutescens, Morella cerifera (= Myrica cerifera)* and *Juniperus virginiana var. silicicola* are frequent associates in the southern part of the range. *Spartina patens* is a characteristic and usually abundant grass; other common herbaceous associates include *Distichlis spicata, Hibiscus moscheutos, Toxicodendron radicans, Teucrium canadense, Festuca rubra, Limonium carolinianum*, and in the south, *Setaria parviflora*. This community often forms an abrupt transition from salt marsh to upland reflecting the relatively higher elevation and less frequent tidal flooding. Shrub cover in this situation tends to be fairly dense, and herbs are sparsely

distributed. Where the topographic relief is more gradual, the community is characterized by an open and relatively evenly spaced shrub stratum with a well-developed herbaceous layer, reflecting an intergrading of this community with the adjacent high salt marsh. Storm-induced disturbance causes periodic die-back of the shrubs restricting the extent of their spread.

Comments: This community is differentiated from *Baccharis halimifolia—Iva frutescens / Panicum virgatum* Shrubland (CEGL006063) by the relative unimportance of *Panicum virgatum* and by the abundance of *Spartina patens* and presence of more southern-ranging species such as *Setaria parviflora*.

Range:

Other States/Provinces: DE:S?, MD:S?, NC:S?, NY:S4, SC:S?, VA:S?

Physiographic Province, Section, Subsection: 232Aa:CCC, 232Bz:CCC, 232C:CP

Synonymy: Shrub succession community, in part (Higgins et al. 1971), Salt marsh community, in part (Hill 1986), Swamp thicket, in part (Klotz 1986), salt marsh and upper border (Barry 1980), salt grass—marsh elder savanna (Martin 1959b), saltbush zone (Boule 1979), Estuarine scrub-shrub wetland (Tiner 1985a), Salt bush—salt meadow marsh (Daiber et al. 1976), *Iva frutescens-Baccharis halimifolia* (Good 1965), *Iva frutescens* and *Baccharis halimifolia* (Klemas et al. 1973), Salt shrub (Reschke 1990), Salt marsh complex, marsh-upland border (Breden 1989)

References: Barry 1980, Boule 1979, Breden 1989, Daiber et al. 1976, Good 1965, Higgins et al. 1971, Hill 1986, Klemas et al. 1973, Klotz 1986, Martin 1959b, Reschke 1990, Schafale and Weakley 1990, The Nature Conservancy (TNC) 1995c, Tiner 1985a

Authors: ECS **Confidence:** 2 **Identifier:** CEGL003921

IV. Dwarf-shrubland

IV. Dwarf-shrubland

IV.A.1.N.a. Caespitose needle-leaved or microphyllous evergreen dwarf-shrubland

IV.A.1.N.a.4. HUDSONIA TOMENTOSA DWARF-SHRUBLAND ALLIANCE

Woolly Beach-heather Dwarf-shrubland Alliance

Concept: This alliance consists of sandy or rocky areas dominated by *Hudsonia tomentosa*. This alliance is largely confined to maritime interdunes. This alliance occurs on well-drained sands of back dunes and interdunes, and is documented from Assateague Island; it is a maritime dwarf-shrubland characterized by *Hudsonia tomentosa*, a species adapted to sand burial. *Hudsonia tomentosa* is dominant, occurring as discrete patches that may coalesce into a dense mat on older, more stabilized dunes. A number of other shrubs, such as *Morella pensylvanica (= Myrica pensylvanica), Morella cerifera (= Myrica cerifera), Pinus taeda* saplings, and *Prunus maritima*, may occur but are low in abundance and cover. *Morella pensylvanica* shrubs and *Pinus taeda* saplings are almost non-existent but can occur as scattered individuals. Herbaceous vegetation is also quite sparse (less than 5% cover) but may include scattered individuals of *Panicum amarum var. amarulum, Panicum amarum var. amarum, Solidago sempervirens, Nuttallanthus canadensis, Lechea maritima, Ammophila breviligulata, Pseudognaphalium obtusifolium (= Gnaphalium obtusifolium), Schizachyrium littorale (= Schizachyrium scoparium ssp. littorale), Dichanthelium acuminatum, Oenothera humifusa, Cyperus grayi, Artemisia stelleriana, Chamaesyce polygonifolia*, and *Diodia teres*. *Toxicodendron radicans* is a common vine. Scattered vines of *Smilax rotundifolia* and canes of *Rubus argutus* are occasional. The

Photo, top left:
Hudsonia tomentosa / Panicum amarum Dwarf-shrubland—b&w photo by Robert Cartica

Photo, top right and bottom:
Chamaedaphne calyculata—{Gaylussacia dumosa}—Decodon verticillatus / Woodwardia virginica Dwarf-shrubland—Color slide by Tom Breden

unstable substrate is influenced by wind-deposited sand and supports no soil development; large patches of sparsely vegetated or unvegetated sand are common.

Comments:

Range: Communities in this alliance are locally abundant on coastal dunes from Maine to North Carolina. Inland types have been reported only from New Hampshire and Maine.

Other States/Provinces: CT DE MA MD ME NC NH NJ NY RI VA

Physiographic Province, Section, Subsection: 221Ad:CC?, **232Ac:**CCC, 232Bz:CCC, 232Ci:CCC, M221:C

Synonymy: Maritime heathland. NY (Reschke 1990); Coastal dune shrubland. NJ (Breden 1989); *Hudsonia tomentosa* dwarf shrub vegetation. CT (Metlzer and Barrett 1993) (); Maritime dune. MA (Swain 1993) (); *Hudsonia tomentosa—Ammophila breviligulata* dune scrub association. DE (Clancy 1993); Riverside *Hudsonia* sand / gravel barren. NH (Sperduto 1994); Inland beach strand and Dry riverbluff opening community. NH (Sperduto 1994); River beach community. ME (Maine Natural Heritage Program (MENHP) 1991); *Hudsonia* dunes (Higgins et al. 1971); *Hudsonia* dune community (Hill 1986); Dunegrass—beach heather—low thicket mixture. NJ (Martin 1959b); dune heath. NY (Johnson 1985b); beach heather community NJ. NJ (Collins and Anderson 1994); dune crest community (Clampitt 1991)

References: Breden 1989, Clancy 1993, Collins and Anderson 1994, Higgins et al. 1971, Hill 1986, Martin 1959b

Authors: A.S. WEAKLEY/L.E. MORSE, KP, ECS **Identifier:** A.1062

HUDSONIA TOMENTOSA / PANICUM AMARUM DWARF-SHRUBLAND

Woolly Beach-heather / Bitter Panicgrass Dwarf-shrubland

[Central Coast Beach Heather Dune Shrubland] **G2** 98-10-14

S1S2 01-08-16

State Estimated EO's: B—Estimate 6–20 occurrences in state.

State Area: B—Between 200–500 acres in state. <1–30 acre patches; overall occurrences are 100–200 acres; patches separated by 1/4 mile are separate occurrences.

Concept: This association is a maritime beach heather community of mid-Atlantic sand dunes. The unstable substrate is influenced by wind-deposited sand and supports no soil development; large patches of sparsely vegetated or unvegetated sand are common. The community is characterized by *Hudsonia tomentosa* occurring as discrete patches that may coalesce into a dense mat on older, more stabilized dunes. A number of other shrubs such as *Morella pensylvanica (= Myrica pensylvanica), Morella cerifera (= Myrica cerifera), Pinus taeda* saplings, and rarely *Prunus maritima* may occur but are low in abundance and cover. *Schizachyrium littorale (= Schizachyrium scoparium ssp. littorale), Ammophila breviligulata, Aristida tuberculosa, Spartina patens*, and *Panicum amarum var. amarulum* are common grasses of this community, and *Toxicodendron radicans* is a common vine. Other herbaceous associates include *Lechea maritima, Cyperus grayi, Artemisia stelleriana, Chamaesyce polygonifolia, Solidago sempervirens*, and *Diodia teres*. This community is locally common on coastal dunes from New Jersey to northern North Carolina.

Comments:

Range: The association is restricted to barrier beaches from New Jersey to northern North Carolina.

Other States/Provinces: DE:S?, MD:S?, NC:S?, VA:S?

Physiographic Province, Section, Subsection: 221Ad:???, **232Ac:**CCC, 232Bz:CCC

Synonymy: *Hudsonia* dunes (Higgins et al. 1971) =, *Hudsonia* dune community (Hill 1986) =, Dunegrass—beach heather—low thicket mixture (Martin 1959b) I, Beach heather community (Collins and Anderson 1994) =, Dune crest community (Clampitt 1991) B,

Hudsonia tomentosa—Ammophila breviligulata dune scrub association (Clancy 1993a) =, Coastal dune shrubland (Breden 1989) B

References: Breden 1989, Clampitt 1991, Clancy 1993, Clancy 1993a, Collins and Anderson 1994, Higgins et al. 1971, Hill 1986, Martin 1959b, The Nature Conservancy (TNC) 1995c

Authors: L. Sneddon, ECS **Confidence:** 2 **Identifier:** CEGL003950

IV.A.1.N.g. Saturated needle-leaved or microphyllous evergreen dwarf-shrubland

IV.A.1.N.g.1. CHAMAEDAPHNE CALYCULATA SATURATED DWARF-SHRUBLAND ALLIANCE

Leatherleaf Saturated Dwarf-shrubland Alliance

Concept: This alliance is found in the northern regions of the midwestern and northeastern United States as well as many regions of Canada in what are typically referred to as 'bogs.' In the peatlands of North Carolina, some elements are part of the pocosin landscape. The ground layer is dominated by ericaceous dwarf-shrubs (>25%). In the north, scattered and stunted (less than 10 m tall) *Picea mariana* and *Larix laricina* may be present, but tree cover is less than 25%. The ground layer is dominated by *Chamaedaphne calyculata*, with *Kalmia polifolia* and *Andromeda polifolia var. glaucophylla (= Andromeda glaucophylla)* typical associates in sub-boreal and boreal regions. Other characteristic species in these regions are *Drosera rotundifolia* and *Sarracenia purpurea*. The ground layer has a continuous mat of sphagnum mosses, usually dominated by *Sphagnum magellanicum, Sphagnum fuscum*, or *Sphagnum angustifolium*. In the southern portion of the range, vegetation of this alliance is found in mucky peat-burns or other openings which form a mosaic with various shrublands (e.g., *Cyrilla racemiflora—Zenobia pulverulenta* Shrubland) in low, medium, or high pocosins (including ombrotrophic blanket bogs) of the outer Coastal Plain of North Carolina. Other characteristic species include *Eriophorum virginicum, Calamovilfa brevipilis, Carex striata var. striata, Utricularia subulata, Lysimachia asperulifolia, Peltandra virginica, Vaccinium macrocarpon, Rhynchospora alba, Polygala brevifolia*, and *Nymphaea odorata*. Stands of this alliance occur both in areas that are truly ombrotrophic (receiving nutrients from rainfall only), with pH <4.2, and areas that are somewhat influenced by groundwater. In the north, this alliance often develops in areas on *Picea mariana* bogs that become too wet to support black spruce.

Comments: This alliance can also grade into 'poor fen' alliances, but those alliances generally contain species such as *Carex aquatilis, Carex lasiocarpa, Carex chordorrhiza, Scheuchzeria palustris*, and *Rhynchospora alba* (Harris et al. 1996, MNNHP 1993). Other characteristics of this alliance in the more southern parts of its range in the United States need to be improved. Now includes the former *Carex striata* Saturated Shrub Herbaceous Alliance (V.A.7.N.o). In the Southeast, this alliance has a restricted distribution and includes only herbaceous openings, with scattered to fairly extensive mats of shrubs, primarily *Chamaedaphne calyculata, Vaccinium macrocarpon*, and *Zenobia pulverulenta*, forming a mosaic with various low pocosin types, in the wettest low pocosins of peat domes (ombrotrophic blanket bogs) of the Outer Coastal Plain of North Carolina. Sometimes the result of peat burns, sometimes permanent or semi-permanent. This alliance is characterized by the following species: *Chamaedaphne calyculata, Carex striata var. striata, Woodwardia virginica, Peltandra* spp. (*Peltandra virginica* and *Peltandra sagittifolia*), *Sarracenia* spp. (*Sarracenia flava, Sarracenia purpurea*, and *Sarracenia rubra*), and *Utricularia* spp. It includes peat burn openings and other mucky depressions in low, medium, or high pocosin, sometimes forming a mosaic with various shrublands; characteristic species here include *Eriophorum virginicum, Calamovilfa brevipilis, Utricularia subulata, Lysimachia asperulifolia, Peltandra sagittifolia*, and other shrubs (scattered). In addition, it

includes mucky openings forming a mosaic with *Cyrilla racemiflora—Zenobia pulverulenta* Shrubland (CEGL003943) in the wettest low pocosins of peat domes (ombrotrophic blanket bogs) of the Outer Coastal Plain of North Carolina. In these examples, characteristic species include *Utricularia subulata, Lysimachia asperulifolia, Peltandra virginica*, and *Nymphaea odorata*. The alliance also includes herbaceous openings which form a mosaic with *Ilex glabra—Lyonia lucida—Zenobia pulverulenta* Shrubland (CEGL003944) in the wettest low pocosins of peat domes (ombrotrophic blanket bogs) of the Outer Coastal Plain of North Carolina. Other characteristic species in these examples include *Vaccinium macrocarpon, Rhynchospora alba, Polygala brevifolia*, and *Chamaedaphne calyculata*.

Range: This alliance is found in Connecticut, Massachusetts, Maine, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, Illinois, Indiana, Michigan, Minnesota, Ohio, Wisconsin, North Carolina; and probably throughout the Canadian provinces, including Manitoba and Ontario.

Other States/Provinces: CT IL IN MA MB ME MI MN NC NH NJ NS NY OH ON PA QC RI VT WI

Physiographic Province, Section, Subsection: 212Aa:CCC, 212Ab:CCC, 212Ba:CCC, 212Bb:CCC, 212Ca:CCC, 212Cb:CCC, 212Da:CCC, 212Db:CCC, 212Dc:CCC, 212Ea:CCP, 212Eb:CCP, 212Ec:CCP, 212Ed:CC?, 212Fa:CCP, 212Fb:CCP, 212Fc:CCP, 212Fd:CCP, 212Ga:CCP, 212Ha:CCC, 212Hb:CCC, 212He:CCC, 212Hh:CCC, 212Hi:CCC, 212Hj:CCC, 212Hk:CC?, 212Hl:CCC, 212Hm:CCP, 212Ho:CCC, 212Hp:CCP, 212Hq:CCC, 212Hr:CCC, 212Hs:CCC, 212Ht:CCC, 212Hu:CCC, 212Hv:CCC, 212Hw:CCC, 212Hx:CCC, 212Hy:CCC, 212Ia:CCC, 212Ib:CCC, 212Ja:CCC, 212Jb:CCP, 212Jc:CCC, 212Jd:CCC, 212Je:CCC, 212Jf:CCC, 212Jj:CCP, 212Jk:CCP, 212Jl:CCP, 212Jm:CCC, 212Jn:CCC, 212Jo:CCP, 212Ka:CCP, 212Kb:CCC, 212La:CCC, 212Lb:CCC, 212Lc:CCC, 212Ld:CCC, 212Ma:CCC, 212Mb:CCC, 212Na:CCC, 212Nb:CCP, 212Nc:CCP, 212Nd:CC?, 212Oa:CCC, 212Pa:CCC, 221Ab:CCP, 221Ac:CCP, 221Ad:CCP, **221Ae:**CCP, 221Af:CCP, 221Ag:CCP, 221Ah:CCP, 221Ai:CCC, 221Aj:CCP, 221Ak:CCC, 221Al:CCP, **221Am:**CCP, **221Ba:**CCP, 221Bb:CCP, 221Bc:CCP, **221Bd:**CCP, 221Fa:CCC, 221Fb:CCC, 221Fc:CCC, 222Ia:CCP, 222Ib:CCP, 222Ic:CCP, 222Id:CCP, 222Ie:CCC, 222If:CCP, 222Jb:CCC, 222Jc:CCC, 222Je:CCC, 222Jf:CCC, 222Jg:CCC, 222Jh:CCC, 222Ji:CCC, 222Ka:CCC, 222Ke:CCC, 222Kf:CCC, 232Aa:CCP, **232Ac:**CC?, 232Cb:CCC, 232Ch:CCC, M212Aa:CCC, M212Ab:CCC, M212Ac:CCC, M212Ad:CCC, M212Ae:CCC, M212Af:CCC, M212Ba:CCP, M212Bb:CCP, M212Ca:CCP, M212Cc:CCP, M212Cd:CCP, M212Da:CCP, M212Db:CCP, M212Dc:CCP, M212Ea:CPP, M212Eb:CPP, M212Fa:CPP, M212Fb:CPP, M221:P

Synonymy: Open Low Shrub Bog (Harris et al. 1996); Semi-treed Bog (Harris et al. 1996); Open Bog (Eggers and Reed 1987); IIC1a. Low Pocosin, in part (Allard 1990); Low Pocosin, in part (Schafale and Weakley 1990); High Pocosin, in part (Schafale and Weakley 1990)

References: Christensen 1979, Eggers and Reed 1987, Faber-Langendoen et al. 1996, Harris et al. 1996, Kologiski 1977, Minnesota Natural Heritage Program (MNNHP) 1993, Schafale and Weakley 1990

Authors: ECS/MCS, KP, ECS **Identifier:** A.1092

CHAMAEDAPHNE CALYCULATA—(GAYLUSSACIA DUMOSA)—DECODON VERTICILLATUS / WOODWARDIA VIRGINICA DWARF-SHRUBLAND

Leatherleaf—(Dwarf Huckleberry)—Swamp-loosestrife / Virginia Chainfern Dwarf-shrubland [Southern New England Bog] **G5**

S1 01-08-16

State Estimated EO's: B—Estimate 6–20 occurrences in state.

State Area: A—Less than 100 acres in total. Patch size ranges from 1/4–10 acres.

Concept: Dwarf-shrub quaking or floating bog of the southern portion of the glaciated northeast. *Chamaedaphne calyculata* is the dominant shrub; other associates include *Kalmia angustifolia, Vaccinium oxycoccos, Gaylussacia dumosa, Pogonia ophioglossoides, Carex trisperma, Rhynchospora alba*. This vegetation is oligotrophic as opposed to ombrotrophic, receiving small amounts of nutrients from groundwater, supporting such species as *Peltandra virginica, Decodon verticillatus, Dulichium arundinaceum*, particularly at the edge of the mat. The bryophyte layer is well-developed, dominated by *Sphagnum capillifolium (= var. capillifolium)* and *Sphagnum fuscum*.
Comments:
Range:
Other States/Provinces: CT:S?, MA:S?, NH:S?, NY:S?, PA:S?, RI:S?
Physiographic Province, Section, Subsection: 212E:CC, 212F:CC, 221A:CC, **221B:**CC, 222I:CC, M212B:CC, M212C:CC
Synonymy:
References: Damman and French 1987
Authors: ECS **Confidence:** 1 **Identifier:** CEGL006008

CHAMAEDAPHNE CALYCULATA / CAREX STRIATA DWARF-SHRUBLAND
Leatherleaf / Peatland Sedge Dwarf-shrubland
[Pine Barrens Bog] **G?**
S2S3 01-08-16

State Estimated EO's: C—Estimate 30–150 occurrences.
State Area: B—Between 100–1,000 acres in state. Patch sizes range 1/4–10 acres.

Concept: Pine barrens bog; "spung"
Comments:
Range:
Other States/Provinces: NY:S?
Physiographic Province, Section, Subsection: 232A:CC
Synonymy:
References:
Authors: ECS **Confidence:** 2 **Identifier:** CEGL006208

IV.A.1.N.g.3. VACCINIUM MACROCARPON SATURATED DWARF-SHRUBLAND ALLIANCE

Large Cranberry Saturated Dwarf-shrubland Alliance

Concept: This alliance, found in parts of the northeastern United States, contains vegetation found in maritime dune-swale communities and mountain bogs of Central Appalachians (beyond the range of *Chamaedaphne calyculata*), as well as cranberry bogs in Ohio. Further information is needed to characterize this alliance.
Comments: The *Sarracenia* bogs of the Maryland Coastal Plain need to be compared with this type. Mountain bogs generally have scattered *Picea rubens* in the canopy, which may require a separate alliance.
Range: This alliance is found in Delaware, Massachusetts, New Jersey, New York, Virginia, and Ohio, and possibly Maryland (?).
Other States/Provinces: DE MA MD? NJ NY RI VA
Physiographic Province, Section, Subsection: 212Aa:PPP, 212Ab:PPP, 212Ba:PPP, 212Bb:PP?, 212Ca:PPP, 212Cb:PP?, 212Da:PPP, 212Db:PPP, 212Dc:PP?, 212Ga:PPP, 212Gb:PPP, 221Ab:CCP, 221Ac:CCP, 221Af:CCP, 221Ag:CCP, 221Ah:CCP, 221Ai:CCP, 221Aj:CCP, 221Ak:CCP, 221Al:CCP, 221Bc:CPP, 221Fa:CCC, 221Fb:CCC, 221Fc:CCC, 222Ji:CCC, **232A:**CC, 232Bz:CCC, M212Ab:PPP, M212Ac:PPP, M212Ad:PPP, M212Ba:PPP, M212Bb:PP?, M212Ca:PPP, M212Cc:PPP, M212Cd:PPP, M212Da:PPP, M212Db:PPP,

M212Dc:PPP, M212Ea:PPP, M221Aa:CCP, M221Ab:CCP, M221Ba:CPP, M221Bb:CPP, M221Da:CPP
Synonymy:
References: Faber-Langendoen et al. 1996
Authors: KP, ECS **Identifier:** A.1094

VACCINIUM MACROCARPON—MORELLA PENSYLVANICA DWARF-SHRUBLAND
Large Cranberry / Northern Bayberry Dwarf-shrubland
[Northern Interdunal Cranberry Swale] **G2** 97-10-22
S1S2 01-08-16

State Estimated EO's: C—Estimate 20–30 occurrences in state.
State Area: A—Less than 100 acres in state. Patch sizes range 1/4–1 acre.

Concept: This maritime community is a small-patch seasonally flooded wetland occurring within low swales behind sand dunes of major dune systems of the northeastern coast. *Vaccinium macrocarpon* is generally dominant, but a number of rushes, sedges, grasses, and forbs co-occur and often obscure the low-growing *Vaccinium macrocarpon*. *Morella pensylvanica (= Myrica pensylvanica)*, although a minor component of the vegetation and is generally restricted to the wetland edge, characterizes this community as coastal. The wetland is seasonally flooded, and is often dry on the surface late in the growing season. A shallow layer of peat overtops deep sand deposits. Associated species include *Pogonia ophioglossoides, Juncus canadensis, Drosera rotundifolia, Drosera intermedia, Lycopodiella inundata (= Lycopodium inundatum), Cladium mariscoides, Schoenoplectus pungens (= Scirpus pungens), Osmunda regalis, Spartina patens, Xyris torta, Calopogon tuberosus, Viola lanceolata, Sphagnum palustre, Bartonia virginica*.
Comments:
Range: This community is confined to major dune systems of the northeastern coast. The greatest number of occurrences are found in Massachusetts, New York, New Jersey, with occasional occurrences in Rhode Island and Delaware. There are no known occurrences in Connecticut.
Other States/Provinces: DE:S?, MA:S?, MD?, NY:S?, RI:S?
Physiographic Province, Section, Subsection: 221A:CC, **232A:**CC, 232Bz:CCC
Synonymy: Cranberry swale? (NAP)
References: Benedict 1977a, Bowman 2000, Conard 1935, Johnson 1981b, Johnson 1985b, Martin 1959b, McAvoy and Clancy 1994, Moul 1969
Authors: ECS **Confidence:** 2 **Identifier:** CEGL006141

IV.A.2.N.c. Tidal needle-leaved or microphyllous evergreen dwarf-shrubland

IV.A.2.N.c.5. SARCOCORNIA PERENNIS—(DISTICHLIS SPICATA, SPARTINA ALTERNIFLORA) TIDAL DWARF-SHRUBLAND ALLIANCE

Woody-glasswort—(Saltgrass, Saltmarsh Cordgrass) Tidal Dwarf-shrubland Alliance

Concept: Tidally flooded hypersaline flats or very shallow depressions, dominated by halophytic herbs, including *Sarcocornia perennis, Salicornia bigelovii, Salicornia virginica, Distichlis spicata*, and stunted *Spartina alterniflora*. Total vegetative cover is quite variable in pannes, from near total absence of vascular plants to a dense cover of *Salicornia bigelovii, Salicornia virginica, Sarcocornia perennis*, or *Spartina alterniflora*. *Limonium carolinianum* is another common associate. In the southern portions of its distribution, *Monanthochloe littoralis* and *Batis maritima* can be major components. Algal mats are characteristically present, visible even in densely vegetated pannes. Blue-green algae are an important component of this community, in some cases contributing significantly

more biomass than do vascular species. The following algae were noted to occur in association with *Spartina alterniflora* in the littoral zone of a Massachusetts salt marsh: *Oscillitoria subuliforms, Oscillitoria amphibia, Lyngbea* spp., *Microcoleus chthonoplastes, Nodularia harveyana, Hydrocoleum lyngbyaceum, Symploca* spp. (Webber 1967). Diagnostic species are *Salicornia bigelovii, Salicornia virginica*, and *Sarcocornia perennis*. Vegetation of this alliance tends to develop in shallow depressions within high salt marshes where drainage is poor. The depressions are flooded by high tides but as the water evaporates during low tide the salinity concentration increases forming 'salt pannes.' Formation of the pannes may result from ice scouring, rafting flotsam, peat compaction, or by mosquito ditch levees which create small impoundments. This community is regularly to irregularly flooded by nearby brackish water. Bare peat and/or mucky soils are prevalent (up to 85% bare soils), and standing water covers this community at high tide.

Comments:

Range: This alliance is found in Alabama, Florida, Georgia, Louisiana, Mississippi, North Carolina, South Carolina, Texas, Connecticut, Delaware, Maine, Maryland, New Hampshire, New Jersey, New York, Rhode Island, and Virginia, and in Canada in New Brunswick and Nova Scotia. It is also found in Tamaulipas, Mexico.

Other States/Provinces: AL CT DE FL GA LA MA MD ME MS MXTM NB NC? NH NJ NS NY RI SC? TX VA

Physiographic Province, Section, Subsection: 212C:PP, 212Db:PPP, 221Aa:CCC, 221Ab:CCC, 221Ac:CCC, 221Ad:CCC, **221Ae:**CC?, 221Aj:CCP, 221Ak:CCC, **221B:**CC, **221Dc:**CPP, 231Fb:CCC, 232Aa:CCC, **232Ab:**CCC, **232Ac:**CCC, 232Bb:CCP, 232Bc:CCP, 232Bd:CCP, 232Bx:CC?, 232Bz:CCC, 232Cb:CC?, 232Ce:CCC, 232Ch:CCP, 232Ci:CCP, 232Db:CC?, 232Dc:CCC, 232Dd:CCC, 232De:CCC, 232Eb:CCC, 232Ed:CCC, 232Ee:CCC, 232Gb:CCC, 255Da:CCC, 255Dc:CCC, 315F:PP

Synonymy: Salt Flat (Wieland 1994b); Salt Flat (Schafale and Weakley 1990); Salt Flat (Nelson 1986); Glasswort—Saltwort Series (Diamond 1993)

References: Diamond 1993, Klotz 1986, Metzler and Barrett 1992, Nelson 1986, Schafale and Weakley 1990, Sneddon et al. 1996, Webber 1967, Wieland 1994a, Wieland 1994b

Authors: SCS/ECS, JT, ECS **Identifier:** A.1705

SARCOCORNIA PERENNIS—SALICORNIA SPP.—SPARTINA ALTERNIFLORA DWARF-SHRUBLAND

Woody-glasswort—Saltwort species—Saltmarsh Cordgrass Dwarf-shrubland

[Salt Panne] **G5**

S3S4 01-08-16

State Estimated EO's: D—Estimate >100 occurrences.

State Area: C—Estimate >1,000 acres in state. Patch size ranges 1/4–5 acres.

Concept: This community is salt panne vegetation dominated by *Salicornia bigelovii, Salicornia virginica, Sarcocornia perennis*, and/or a short form of *Spartina alterniflora*. Total vegetation cover is quite variable in pannes, from near total absence of vascular plants to a dense cover of *Salicornia bigelovii, Salicornia virginica, Sarcocornia perennis*, or *Spartina alterniflora*. *Limonium carolinianum* is another common associate. Algal mats are characteristically present, visible even in densely vegetated pannes. Blue-green algae are an important component of this community, in some cases contributing significantly more biomass than do vascular species. The following algae were noted to occur in association with *Spartina alterniflora* in the littoral zone of a Massachusetts salt marsh: *Oscillatoria subuliformis, Oscillatoria amphibia, Lyngbea* spp., *Microcoleus chthonoplastes, Nodularia harveyana, Hydrocoleum lyngbyaceum, Symploca* spp. (Webber 1967). Diagnostic species are *Salicornia bigelovii, Salicornia virginica*, and *Sarcocornia perennis*. This community tends to develop in shallow depressions within high salt marshes where drainage is poor. The depressions are flooded by high tides but as the water evaporates

during low tide the salinity concentration increases forming 'salt pannes.' Formation of the pannes may result from ice scouring, rafting flotsam, peat compaction, or by mosquito ditch levees which create small impoundments. This community is regularly to irregularly flooded by nearby brackish water. Bare peat and mucky soils are prevalent (up to 85% bare soils) and, at high tide, standing water covers this community. This community occurs in coastal salt marshes from Nova Scotia to the Carolinas, north of the range of *Batis maritima*.

Comments:

Range:

Other States/Provinces: CT:S?, DE:S?, MA:S?, MD:S?, ME:S?, NB:S?, NC?, NH:S?, NS:S?, NY:S?, RI:S?, SC?, VA:S?

Physiographic Province, Section, Subsection: 212C:PP, 212D:PP, 221Aa:CCC, 221Ab:CCC, 221Ac:CCC, 221Ad:CCC, 221Ak:CCC, 232Aa:CCC, **232Ab:**CCC, **232Ac:**CCC, 232Bz:CCC, 232Ci:CCP

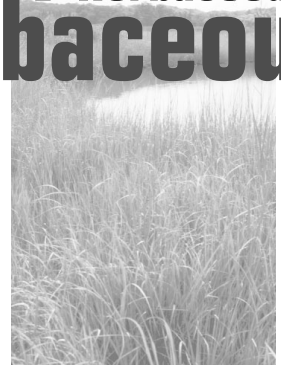
Synonymy: The pans (Hill 1986), The pans (Higgins et al. 1971), *Salicornia europaea—Spartina alterniflora* community (Metzler and Barrett 1992), Salt marsh complex, pannes (Breden 1989), Salt panne (Reschke 1990), *Spartina alterniflora / Salicornia europaea* community, salt panne (Clancy 1993), Pan (Nichols 1920), Panne (Good 1965), *Salicornia* tidal flat (Clovis 1968), Salt pan (Klotz 1986), *Salicornia—Bassia* salt flat (Harvill 1965), *Salicornietum ambiguae* (Conard 1935), Salt panne and stunted *Spartina alterniflora* community (Miller and Egler 1950), Panne marsh (Baumann 1978b), Salt panne (Baumann 1978b)

References: Baumann 1978b, Breden 1989, Clancy 1993, Clovis 1968, Conard 1935, Good 1965, Harvill 1965, Higgins et al. 1971, Hill 1986, Klotz 1986, Metzler and Barrett 1992, Miller and Egler 1950, Nichols 1920, Reschke 1990, Schafale and Weakley 1990, Webber 1967

Authors: ECS **Confidence:** 2 **Identifier:** CEGL00430

V. Herbaceous Vegetation

V. Herbaceous Vegetation



V.A.5.N.c. Medium-tall sod temperate or subpolar grassland

V.A.5.N.c.2. AMMOPHILA BREVILIGULATA HERBACEOUS ALLIANCE

American Beachgrass Herbaceous Alliance

Concept: Dune grasslands dominated by *Ammophila breviligulata*. This alliance includes maritime dune grasslands dominated by *Ammophila breviligulata, Panicum amarum var. amarum*, and *Panicum amarum var. amarulum*. Plant cover is variable, ranging from 10–75%, but is usually low. Other associated species include *Solidago sempervirens, Strophostyles helvula, Triplasis purpurea, Cenchrus tribuloides, Chamaesyce polygonifolia, Oenothera humifusa, Schoenoplectus pungens (= Scirpus pungens)* (where overwashed by sand), *Diodia teres, Cakile edentula ssp. edentula, Nuttallanthus canadensis, Salsola kali ssp. kali (= Salsola caroliniana), Lechea maritima*, and *Spartina patens*. Sparse individuals of stunted *Morella pensylvanica (= Myrica pensylvanica)* shrubs and seedlings may occur, but make up less than 2% of the total vegetation cover. Diagnostic species are *Ammophila breviligulata, Solidago sempervirens, Panicum amarum var. amarulum*, and *Oenothera humifusa*. This dune grassland community occurs almost exclusively on sandy, unstable, droughty substrates with no soil profile development. Eolian processes cause active sand deposition and erosion. The sand substrate is usually visible, and litter accumulation from plant debris is nearly absent. This community generally occurs on foredunes that receive the force of wind and salt spray, but is beyond the influence of most storm tides.

Photos, clockwise top left:
Peltandra virginica—Pontederia cordata Tidal Herbaceous Vegetation—Color slide by Cynthia Coritz
Cladium mariscoides—Danthonia sericea—Lophiola aurea Herbaceous Vegetation—Color photo by Kathleen Strakosch Walz.
Spartina alterniflora / (Ascophyllum nodosum) Acadian / Virginian Zone Herbaceous Vegetation—color slide by Robert Cartica

Comments: This grassland often occurs in a complex with *Morella pensylvanica / Diodia teres* Shrubland (CEGL003881). It is restricted to the mid-Atlantic Coast and is vulnerable to development pressure.
Range: This alliance occurs on dunes and sandy shores from Maine south to northern North Carolina, on Lake Champlain shorelines in Vermont, and on the Great Lakes shoreline in Michigan, Wisconsin, and Ontario, Canada.
Other States/Provinces: CT DE IL IN MA MD ME MI NC NH NJ NY ON RI VA VT WI
Physiographic Province, Section, Subsection: 212Cb:CCC, 212Db:CCC, 212Dc:CCC, 212Ec:CPP, 212Hd:CCC, 212He:CCC, 212Hi:CCP, 212Hj:CCC, 212Hl:CCC, 212Hm:CCP, 212Hn:CCC, 212Ho:CCC, 212Hr:CCP, 212Hw:CCC, 212Hx:CCC, 212Ia:CCC, 212Ja:CCC, 212Oa:CCC, 212Ob:CCC, 212Pa:CCC, 221Aa:CCP, 221Ab:CCC, 221Ac:CCC, 221Ad:CCC, 221Aj:CCP, 221Ak:CCC, 221E:CC, 222Ia:CPP, 222Ie:CPP, 222Ja:CCC, 222Jj:CCC, 222Kg:CCC, 232Aa:CCC, **232Ab:**CCC, **232Ac:**CCP, 232Bc:CCP, 232Bd:CCP, 232Bt:CCP, 232Ch:CCP
Synonymy: Dune Grass, in part (Schafale and Weakley 1990); Dunegrass community (Hill 1986); Dunegrass community (Higgins et al. 1971); Mid-Atlantic *Ammophila breviligulata—Panicum amarulum* dune grassland variant (Clancy 1993); *Ammophila—Panicum amarum* dunes (Harvill 1965); *Panicum—Ammophila* community (Egler 1962); foredune (Klotz 1986); foredune (Boule 1979); sand dune (Fender 1937); dune community (Baumann 1978b); coastal dune grass community (Breden 1989); primary dune (Stalter 1990); dunegrass community (Clampitt 1991)
References: Baumann 1978b, Boule 1979, Breden 1989, Chapman et al. 1989, Clampitt 1991, Clancy 1993, Egler 1962, Faber-Langendoen et al. 1996, Fender 1937, Harvill 1965, Higgins et al. 1971, Hill 1986, Klotz 1986, Martin 1959b, Schafale and Weakley 1990, Sneddon 1996, Stalter 1990
Authors: ECS, JT, ECS **Identifier:** A.1207

AMMOPHILA BREVILIGULATA—LATHYRUS JAPONICUS HERBACEOUS VEGETATION
American Beachgrass—Beach Pea Herbaceous Vegetation
[Northern Beachgrass Dune] **G4?**
S2S3 01-08-16

State Estimated EO's: C—Estimate 30–100 occurrences.
State Area: C—Estimate 1,000–10,000 acres in state. Patch sizes range 2–200 acres.

Concept: This dune grassland community of maritime beaches occurs on the North Atlantic coast from New Jersey north to central Maine. The substrate is wind-deposited sand of foredunes with no soil development. Vegetation cover is often sparse and bare sand is usually evident. The dominant species is *Ammophila breviligulata*. Characteristic associates include *Lathyrus japonicus, Solidago sempervirens, Chamaesyce polygonifolia*, and *Cakile edentula*. Other associates may include *Carex silicea, Artemisia stelleriana, Lechea maritima, Polygonella articulata, Xanthium strumarium, Suaeda maritima, Cyperus lupulinus (= Cyperus filiculmis)*, and *Cyperus grayi*. Other grasses that may be present include *Panicum amarum* in the southern portion of the range, and *Leymus mollis* at the northern end of the range.
Comments:
Range:
Other States/Provinces: CT:S?, MA:S?, ME:S?, NH:S?, NY:S?, RI:S?
Physiographic Province, Section, Subsection: 212Cb:CCC, 212Db:CCC, 212Dc:CCC, 221Aa:CCP, 221Ab:CCC, 221Ac:CCC, 221Ad:CCC, 221Ak:CCC, 232Aa:CCC, **232Ab:**CCC

Synonymy:
References: Johnson 1985b, Martin 1959b, Moul 1969, Nelson and Fink 1980, Sperduto 1997a
Authors: ECS **Confidence:** 2 **Identifier:** CEGL006274

AMMOPHILA BREVILIGULATA—PANICUM AMARUM HERBACEOUS VEGETATION
American Beachgrass—Bitter Panicgrass Herbaceous Vegetation
[Beachgrass—Panicgrass Dune Grassland] **G2** 98-10-08
S1S2 01-08-16

State Estimated EO's: BC—Estimate 10–30 occurrences.
State Area: B—Estimate 200–1,000 acres in state. Patch sizes may range 1/4–50 acres.

Concept: This community is a maritime dune grassland dominated by *Ammophila breviligulata, Panicum amarum var. amarum*, and *Panicum amarum var. amarulum*. Plant cover is variable, ranging from 10-75% but is usually low. Other associated species include *Solidago sempervirens, Strophostyles helvula, Triplasis purpurea, Cenchrus tribuloides, Chamaesyce polygonifolia*. *Panicum amarum var. amarulum, Oenothera humifusa, Schoenoplectus pungens (= Scirpus pungens)* (where overwashed by sand), *Diodia teres, Cakile edentula ssp. edentula, Nuttallanthus canadensis, Salsola kali ssp. kali (= Salsola caroliniana), Lechea maritima* and *Spartina patens*. Sparse individuals of stunted *Morella pensylvanica (= Myrica pensylvanica)* shrubs and seedlings occur but make up less than 2% of the total vegetation cover. Diagnostic species are *Ammophila breviligulata, Solidago sempervirens, Panicum amarum var. amarulum*, and *Oenothera humifusa*. This dune grassland community occurs almost exclusively on sandy, unstable, droughty substrates with no soil profile development. Eolian processes cause active sand deposition and erosion. The sand substrate is usually visible, and litter accumulation from plant debris is nearly absent. This community generally occurs on foredunes that receive the force of wind and salt spray, but is beyond the influence of most storm tides. It is found on maritime dunes from southern New Jersey south to the Chesapeake Bay, Virginia, as well as on the northern North Carolina coast.

Comments: This grassland often occurs in a complex with *Morella pensylvanica / Diodia teres* Shrubland (CEGL003881). It contains several species characteristic to *Cakile edentula ssp. edentula—Mertensia maritima* Sparse Vegetation (CEGL006106), but this grassland is differentiated by (1) its location beyond storm tide influence, (2) dominance by perennial rather than annual species, (3) greater plant cover on average, and (4) greater prevalence of *Solidago sempervirens*.

Range: This community occurs on maritime dunes from Long Island, New York, south to North Carolina.

Other States/Provinces: DE:S?, MD:S?, NC:S?, NJ:S2S3?, NY?, VA:S?

Physiographic Province, Section, Subsection: 232Aa:CCP, **232Ab:**CCP, **232Ac:**CCP, 232Bt:CCP, 232C:CC

Synonymy: Dunegrass community (Hill 1986) =, Dunegrass community (Higgins et al. 1971) =, Mid-Atlantic *Ammophila breviligulata, Panicum amarulum* dune grassland variant (Clancy 1993a) =, *Ammophila, Panicum amarum* dunes (Harvill 1965) =, *Panicum, Ammophila* community (Egler 1962) =, Foredune (Klotz 1986) =, Foredune (Boule 1979) =, Dune community (Baumann 1978a) =, Dune grass (Schafale and Weakley 1990) B, Primary dune (Stalter and Lamont 1990) B, Dunegrass community (Clampitt 1991) B, Coastal dune grass community (Breden 1989) B, Sand dune (Fender 1937) =

References: Baumann 1978a, Baumann 1978b, Boule 1979, Breden 1989, Clampitt 1991, Clancy 1993, Clancy 1993a, Egler 1962, Fender 1937, Harvill 1965, Higgins et al. 1971, Hill 1986, Klotz 1986, Schafale and Weakley 1990, Stalter 1990, Stalter and Lamont 1990, The Nature Conservancy (TNC) 1995c

Authors: L. Sneddon, ECS **Confidence:** 2 **Identifier:** CEGL004043

V.A.5.N.e. Short sod temperate or subpolar grassland

V.A.5.N.e.1. SPARTINA PATENS—(SCHOENOPLECTUS PUNGENS) HERBACEOUS ALLIANCE

Saltmeadow Cordgrass—(Threesquare) Herbaceous Alliance

Concept: This alliance includes upland dune grassland of barrier islands of the Mid-Atlantic and Gulf coasts. *Spartina patens* and *Schoenoplectus pungens (= Scirpus pungens)* are characteristically dominant, though other graminoids such as *Schoenoplectus pungens, Sporobolus virginicus, Cenchrus spinifex (= Cenchrus incertus), Cenchrus tribuloides*, and *Paspalum distichum* may be codominant or prominent within their respective ranges. In parts of the range of this alliance, *Spartina patens* is dominant and *Schoenoplectus pungens* may be absent. This community characteristically occupies overwash terraces or low dunes, less well-developed than those dominated by *Uniola paniculata* (from North Carolina south and west to Texas and Tamaulipas, Mexico) or by *Ammophila breviligulata* (from North Carolina northwards). Total vegetation cover is variable, ranging from quite sparse (25% cover) to dense. Bare sand is often visible through the vegetation, and there is no soil profile development. Species diversity is variable; although it may be quite low and confined to the nominal species in the northern part of the range, it may be of greater diversity. Other components of this vegetation include *Strophostyles helvula, Solidago sempervirens, Cenchrus tribuloides, Setaria parviflora, Distichlis spicata, Sabatia stellaris, Ammophila breviligulata, Suaeda linearis, Bassia hirsuta* (an exotic), *Atriplex patula, Polygonum glaucum, Spergularia salina (= Spergularia marina), Salicornia bigelovii, Salicornia virginica, Fimbristylis castanea*, and *Cakile edentula ssp. edentula*. Woody species may include scattered individuals of *Toxicodendron radicans, Solidago sempervirens, Lythrum lineare, Kosteletzkya virginica*, and seedlings of *Baccharis halimifolia*. The plants of this community are influenced by sand deposited by storm surges. Storm overwash is a prevalent natural disturbance to this community. This community appears to be successional between interdunal herbaceous wetlands and interdunal herbaceous/shrub uplands.

Comments:

Range: This alliance is reported from coastal areas from New York on the Atlantic Coast around to Tamaulipas, Mexico, on the Gulf Coast.

Other States/Provinces: AL DE FL LA MD MS? MXTM? NC NJ NY TX VA

Physiographic Province, Section, Subsection: 231Fb:PPP, 232Aa:CCC, **232Ac:**CCC, 232Bz:CCC, 232Ch:CCP, 232Ci:CC?, 232Dd:CCC, 232De:CCC, 232Eb:CC?, 232Ed:CCC, 232Ee:CCC, 255Dc:CCC

Synonymy: Maritime Dry Grassland (Schafale and Weakley 1990); Wash (Hill 1986); Wash (Higgins et al. 1971); grassland community (Baumann 1978b); low dune community (Boule 1979); dunegrass community, in part (Higgins et al. 1971); Dry community of barrier flats (Travis and Godfrey 1976); secondary dunes (Klotz 1986)

References: Baumann 1978b, Boule 1979, Higgins et al. 1971, Hill 1986, Klotz 1986, Schafale and Weakley 1990, Travis and Godfrey 1976

Authors: ECS, JT, ECS **Identifier:** A.1274

SPARTINA PATENS—SCHOENOPLECTUS PUNGENS—SOLIDAGO SEMPERVIRENS HERBACEOUS VEGETATION

Saltmeadow Cordgrass—Threesquare—Seaside Goldenrod Herbaceous Vegetation [Overwash Dune Grassland] **G2G3** 98-11-04

S? 01-08-16

State Estimated EO's: ?—Not yet ranked in New Jersey.

State Area:

Concept: This community is an upland dune grassland of mid-Atlantic barrier islands. *Spartina patens*, and sometimes *Schoenoplectus pungens (= Scirpus pungens)*, or both are dominant on dunes or overwash terraces. Total vegetation cover is variable, ranging from quite sparse (25% cover) to dense. Bare sand is often visible through the vegetation, and there is no soil profile development. Species diversity is variable; although it may be quite low and confined to the nominal species in the northern part of the range, it may be of greater diversity, including *Strophostyles helvula, Solidago sempervirens, Cenchrus tribuloides, Setaria parviflora, Distichlis spicata, Sabatia stellaris, Ammophila breviligulata, Suaeda linearis, Bassia hirsuta, Atriplex patula, Polygonum glaucum, Spergularia salina (= Spergularia marina), Salicornia bigelovii, Salicornia virginica, Fimbristylis castanea*, and *Cakile edentula ssp. edentula*. Woody species may include scattered individuals of *Toxicodendron radicans, Solidago sempervirens, Lythrum lineare, Kosteletzkya virginica*, and seedlings of *Baccharis halimifolia*. The plants of this community are influenced by sand deposited by storm surges. Storm overwash is a prevalent natural disturbance to this community. This community appears to be a successional step between interdunal herbaceous wetlands and interdunal herbaceous/shrub uplands. It is interesting to note that approximately 10-20 cm below the sandy surface of this vegetation often lies the dark organic soils of a buried wetland. This community ranges from Maryland to North Carolina.

Comments: This community differs ecologically from dune grasslands dominated by *Ammophila breviligulata* or *Uniola paniculata*, which are primarily impacted by wind-deposited sand. This community is impacted by wave-deposited sand.

Range:

Other States/Provinces: DE:S?, MD:S?, NC:S?, NY:S?, VA:S?

Physiographic Province, Section, Subsection: 232Aa:CCC, **232Ac:**CCC, 232Bz:CCC, 232Ci:C??

Synonymy: Wash (Hill 1986) =, Wash (Higgins et al. 1971) =, Dunegrass community, in part (Higgins et al. 1971) =, Grassland community (Baumann 1978a) =, Low dune community (Boule 1979) =, Dry community of barrier flats (Travis and Godfrey 1976) B, Secondary dunes (Klotz 1986) B, Overwash community (Klotz 1986) B

References: Baumann 1978a, Boule 1979, Higgins et al. 1971, Hill 1986, Klotz 1986, Schafale and Weakley 1990, The Nature Conservancy (TNC) 1995c, Travis and Godfrey 1976, Zaremba and Leatherman 1984

Authors: L. Sneddon, ECS **Confidence:** 2 **Identifier:** CEGL004097

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

V.A.5.N.k.39. CALAMAGROSTIS CANADENSIS SEASONALLY FLOODED HERBACEOUS ALLIANCE

Bluejoint Seasonally Flooded Herbaceous Alliance

Concept: This alliance is found throughout the northern states of the United States, excluding the Great Plains states. It is a wide-ranging alliance with much variability in species composition and habitat. Stands of this alliance have a dense graminoid cover, generally over 1 m tall, with either a flat or tussocky microtopography. Tall shrubs may occupy as much as 25% cover. *Calamagrostis canadensis* is the characteristic dominant but can be associated with *Phalaris arundinacea* or a variety of Carices. Other associates include, in the Northeast, shrubs such as *Viburnum nudum, Alnus incana*, or *Alnus serrulata, Viburnum dentatum, Spiraea alba*, and graminoids such as *Agrostis gigantea (= Agrostis alba)*. In the Midwest, typical associates include several Carices, such as *Carex stricta, Carex rostrata*, or *Carex lacustris*, and occasionally *Poa palustris* or *Glyceria*

grandis (Harris et al. 1996). The ground layer can be a heavy mat of grass stems and leaves, with patches of bare soil present in wetter locations.

The habitat of this alliance is typically mineral soil or well-decomposed peat, usually held together by a dense root mat. Stands are found in floodplains of small streams, beaver meadows, and lakeshores. The hydrology is typically seasonally flooded (Harris et al. 1996). In the southern Appalachians of Tennessee and Virginia, this vegetation occurs in depression meadows and occasionally in beaver ponds.

Comments: Where *Calamagrostis* occurs in relatively pure stands or with a variety of forbs as codominants, stands can be assigned relatively confidently to this alliance. However, stands that are codominated by *Carex* species may overlap in composition with alliances such as V.A.5.N.k *Carex stricta* Seasonally Flooded Herbaceous Alliance (A.1397) or V.A.5.N.k *Carex lacustris* Seasonally Flooded Herbaceous Alliance (A.1367). These relationships require further study, as does the very broad range of the alliance, which currently stretches from California to Maine.

Range: This alliance ranges over much of the northern and western United States. In the eastern United States, it is found from Vermont south and west through the New England states into Virginia, West Virginia and Tennessee. It also occurs in the Upper Midwest in Michigan, Minnesota, and Wisconsin. In the western United States, it is reported from almost all western states, from Montana south into Colorado, and west into Washington, Oregon and California. It has not been reported from New Mexico, Arizona or Nevada. In Canada it is reported from Ontario, but undoubtedly occurs elsewhere.

Other States/Provinces: BC? CA CO CT DE ID MA MD ME MI MN MT ND NH NJ NY ON OR PA RI SD UT VA? VT WA WI WV WY

Physiographic Province, Section, Subsection: 212Cb:CCC, 212Ea:CPP, 212Eb:CPP, 212Ec:CPP, 212Ed:CP?, 212Fa:CPP, 212Fb:CPP, 212Fc:CPP, 212Fd:CPP, 212Ga:CPP, 212Gb:CPP, 212Hj:CCC, 212Hs:CCC, 212Hx:CCC, 212Ib:CCC, 212La:CPP, 212Na:CPP, 221Aa:CCP, 221Ab:CC?, 221Ac:CC?, 221Ad:CC?, **221Ae:**CCP, 221Af:CC?, 221Ag:CC?, 221Ah:CC?, 221Ai:CC?, 221Ak:CC?, 221Al:CC?, **221Am:**CCP, **221Ba:**CPP, 221Bb:CPP, 221Bc:CP?, **221Bd:**CPP, **221Da:**CPP, 221Db:CPP, 221Ea:CPP, 221Eb:CPP, 221Fa:CPP, 221Fb:CPP, 222Ia:CPP, 222Ib:CPP, 222Ic:CPP, 222Id:CPP, 222Ie:CPP, 222If:CPP, 222Jg:CCC, 222Na:CCC, 231Al:PPP, **232Ac:**CCP, 232Ad:CCP, 251Aa:CCC, M212Aa:CPP, M212Ab:CPP, M212Ad:CP?, M212Ba:C??, M212Bb:C??, M212Ca:CP?, M212Cc:CP?, M212Cd:CPP, M212Da:CPP, M212Db:CPP, M212Dc:CPP, M212Ea:CPP, M212Eb:CPP, M212Fa:CPP, M212Fb:CPP, M221Aa:CPP, M221Ab:CPP, M221Ba:CPP, M221Bb:CPP, M221Bc:CPP, M221Bd:CPP, M221Be:CPP, M221Bf:CPP, M221Ca:CPP, M221Cb:CPP, M221Da:CCP, M221Db:CCP, M221Dc:CC?, M221Dd:CCC, M242B:C?, M242C:CC, M261A:CC, M261D:CC, M261E:CC, M331A:CC, M331D:C?, M331G:CC, M331H:CC, M331I:CC, M331J:C?, M332A:CC, M332B:CC, M332C:CC, M332D:CC, M332E:CC, M332F:CC, M333A:CC, M333B:CC, M333C:CC, M333D:CC, M334A:CC

Synonymy: Meadow Marsh, in part (Harris et al. 1996); Wet Meadows, in part (Eggers and Reed 1987); Wet Meadows, in part (Minnesota Natural Heritage Program (MNNHP) 1993); *Calamagrostis canadensis* Series. equivalent (Mattson 1984); *Calamagrostis canadensis* Habitat Type. equivalent (Hansen et al. 1995); *Calamagrostis canadensis* Series. equivalent (Johnston 1987)

References: Cooper 1986a, Cooper and Cottrell 1990, Crowe and Clausnitzer 1997, Eggers and Reed 1987, Faber-Langendoen et al. 1996, Girard et al. 1997, Gysel 1960, Hansen et al. 1988b, Hansen et al. 1991, Hansen et al. 1995, Harris et al. 1996, Johnston 1987, Kittel et al. 1999, Komarkova 1976, Komarkova 1986, Kovalchik 1993, Mattson 1984, Minnesota Natural Heritage Program (MNNHP) 1993, Mutel 1976, Mutel and Marr 1973, Mutz and Queiroz 1983, Padgett et al. 1989, Wilson 1969

Authors: MCS/ECS/SCS 6-96, MOD. M., KP, MCS **Identifier:** A.1400

Calamagrostis canadensis—Phalaris arundinacea Herbaceous Vegetation
Bluejoint—Reed Canary Grass Herbaceous Vegetation
[Bluejoint Wet Meadow] **G4G5** 00-03-31
S? 01-08-16

State Estimated EO's: ?—Not yet ranked in New Jersey.
State Area:

Concept: This wet meadow vegetation is of widespread distribution in the northeastern and midwestern United States and central and eastern Canada. Stands occur on the floodplains of small streams, in poorly drained depressions, beaver meadows, and lakeshores. Soils are typically mineral soil or well-decomposed peat, with a thick root mat. Water regime varies between temporarily and seasonally flooded. Graminoid cover is typically dense, and can form hummocky microtopography. *Calamagrostis canadensis* dominates, often in almost pure stands or with tall sedges, such as *Carex aquatilis, Carex lacustris, Carex rostrata*, and *Carex stricta*. In fen transitions, *Carex lasiocarpa* can be present. *Agrostis gigantea (= Agrostis alba), Glyceria grandis, Poa palustris, Scirpus cyperinus*, and *Typha latifolia* are sometimes abundant. Forbs include *Campanula aparinoides, Epilobium leptophyllum, Eupatorium maculatum, Iris versicolor, Polygonum amphibium*, and *Comarum palustre (= Potentilla palustris)*. Scattered shrubs, such as *Viburnum nudum, Viburnum dentatum, Spiraea alba, Alnus incana*, or *Alnus serrulata*, may be present.
Comments: This type can grade into sedge meadows. A guideline of perhaps <50% sedges may be suggested as a criteria for the definition of this type compared to sedge meadow types. Harris et al. (1996) suggest that the bluejoint meadow type is drier than sedge meadows and less peaty than shore fens.
Range: This wet meadow vegetation is widely distributed in the northeastern and midwestern United States and south-central and southeastern Canada. It ranges from Maine south to West Virginia and possibly Virginia and west to Minnesota.
Other States/Provinces: CT:S?, DE:S?, MA:S?, MD:S?, ME:S?, MI:S?, MN:S?, NH:S?, NY:S?, ON:S?, PA:S?, RI:S?, VA?, VT:S?, WI:SU, WV:S?
Physiographic Province, Section, Subsection: 212Hj:CCC, 212Hs:CCC, 212Hx:CCC, 212Ib:CCC, 212La:CPP, 212Na:CPP, 221:C, 222Jg:CCC, 222Na:CCC, 251Aa:CCC, M212:C, M221Db:???, M221Dc:???, M221Dd:???
Synonymy: Meadow marsh: bluejoint grass (W13) (Harris et al. 1996) =, Boreal alluvial tall meadow (NAP) (Harris et al. 1996) =, Canada bluejoint-tussock sedge meadow (CAP) (Harris et al. 1996) =
References: Harris et al. 1996
Authors: ECS **Confidence:** 3 **Identifier:** CEGL005174

V.A.5.N.k.65. CAREX STRIATA SEASONALLY FLOODED HERBACEOUS ALLIANCE
Peatland Sedge Seasonally Flooded Herbaceous Alliance

Concept: 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.

Comments:
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 walteriana (= 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.
Other States/Provinces: DE FL MD NC NJ NY SC VA
Physiographic Province, Section, Subsection: 221Aa:???, 232Aa:CPP, **232Ac:**CPP, 232Ba:CPP, 232Br:CPP, 232Cb:CCC, 232Ch:CCC, 232Dc:CCC
Synonymy: Depression Meadow, in part (Nelson 1986)
References: Nelson 1986, Tyndall et al. 1990
Authors: D.J. ALLARD, MOD., MP, ECS **Identifier:** A.1426

CAREX STRIATA VAR. BREVIS HERBACEOUS VEGETATION
Northern Peatland Sedge Herbaceous Vegetation

G?
S1S3 01-08-16

State Estimated EO's: C—Estimated >20 occurrences in state.
State Area: U—State may have between 20 to >100 acres. Patch size ranges 1/4–2 acres.

Concept: This vegetation occupies Coastal Plain depression meadows, and is dominated by *Carex striata var. brevis (= Carex walteriana var. brevis)*. Examples include vegetation on the outer margins of Coastal Plain pond shores in New York, Maryland and Delaware or in localized swales in the New Jersey pine barrens. The 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, Bidens frondosa, Rhynchospora macrostachya, Rhynchospora chalarocephala, Fimbristylis autumnalis, Juncus canadensis, Dulichium arundinaceum*, and *Panicum hemitomon*. *Sphagnum* is often abundant.
Comments:
Range:
Other States/Provinces: DE:S?, MD:S?, NC:S?, NY:S?, SC:S?, VA:S?
Physiographic Province, Section, Subsection: 232A:C?, 232B:C?, 232Cb:CCC, 232Ch:CCC
Synonymy:
References: Berdine and Gould 1999, Bowman 2000, Nelson 1986, Tyndall et al. 1990
Authors: ECS **Confidence:** 1 **Identifier:** CEGL004120

V.A.5.N.k.36. CAREX STRICTA SEASONALLY FLOODED HERBACEOUS ALLIANCE
Tussock Sedge Seasonally Flooded Herbaceous Alliance

Concept: This alliance, found primarily in the Great Lakes and eastern regions of the United States, includes seasonally flooded communities dominated by the sedge *Carex stricta*, often occurring with other tussock-forming sedges. *Carex stricta* often occurs with *Calamagrostis canadensis*. A variety of forb species are found in these stands, including tall forbs such as *Asclepias incarnata, Angelica atropurpurea, Eupatorium maculatum, Eupatorium perfoliatum, Thalictrum dasycarpum*, and low forbs such as *Lycopus americanus, Galium obtusum*, and *Thelypteris palustris*.

Stands occur along slow streams and near inlets and outlets of lakes or ponds and may be inundated with water during floods. These wetlands generally contain little or no *Sphagnum* and can be the result of beaver-caused flooding of once more sphagnous wetlands. The ground may be flooded in the spring or after heavy rains, but it typically

lies just above the permanent water table. Soils are either a raw sedge peat or a muck comprised of decomposed peat.

Comments: Curtis (1959) discusses a number of differential species that in Wisconsin may distinguish Southern Sedge Meadow (*Carex stricta*-dominated) from Northern Sedge Meadow. *Carex stricta* meadows are usually more moist than wet prairies and drier than shallow marshes, such as those dominated by *Carex lacustris*.

Range: This alliance is found in North Carolina, Connecticut, Delaware, Massachusetts, Maryland, Maine, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, Virginia, West Virginia, Illinois, Indiana, Iowa, Michigan, Minnesota, North Dakota (?), and Wisconsin; and in Canada in Ontario.

Other States/Provinces: CT DE IA IL IN MA MD ME MI MN NC ND NH NJ NY ON PA RI VA VT WI WV

Physiographic Province, Section, Subsection: 212Aa:C??, 212Ab:C??, 212Ba:C??, 212Bb:C??, 212Ca:CC?, 212Cb:CCC, 212Da:C??, 212Db:C??, 212Dc:C??, 212Ea:CP?, 212Eb:CP?, 212Ec:CPP, 212Ed:CPP, 212Fa:C??, 212Fb:C??, 212Fc:C??, 212Ga:CPP, 212Gb:CP?, 212Hb:CCC, 212Hl:CCC, 212Hm:CCP, 212Hn:CCP, 212Ho:CCP, 212Hp:CCP, 212Hq:CCP, 212Hr:CCP, 212Hs:CCP, 212Ht:CCP, 212Hu:CCP, 212Hv:CCC, 212Hw:CCP, 212Hx:CCP, 212Hy:CCC, 212Ib:CPP, 212Ja:CCP, 212Jb:CCP, 212Jc:CCP, 212Je:CCP, 212Jf:CCC, 212Jj:CCP, 212Jk:CCC, 212Jl:CCP, 212Jm:CCC, 212Ka:CPP, 212Mb:CPP, 212Na:CPP, 212Nb:CPP, 212Nc:CPP, 221Aa:???, 221Ab:???, 221Ac:???, 221Ad:???, **221Ae:**???, 221Af:???, 221Ag:???, 221Ah:???, 221Ai:???, 221Aj:???, 221Ak:???, 221Al:???, **221Am:**???, **221Ba:**???, 221Bb:???, 221Bc:???, **221Bd:**???, **221Da:**???, **221Dc:**???, 221Ea:???, 221Fa:???, 222Ha:CPP, 222Hb:CPP, 222Ia:C??, 222Ib:C??, 222Ic:C??, 222Id:C??, 222Ie:C??, 222If:C??, 222Ja:CCP, 222Jb:CCC, 222Jg:CCC, 222Jh:CCC, 222Ji:CCC, 222Jj:CCC, 222Ka:CCC, 222Kb:CCC, 222Kd:CCC, 222Ke:CCC, 222Kf:CCC, 222Kg:CCC, 222Kh:CCC, 222Ki:CCC, 222Kj:CCC, 222Lb:CCC, 222Lc:CCC, 222Le:CCC, 222Lf:CCC, 222Me:CCC, 231Aa:CC?, 231Ae:CC?, 231Af:CC?, 231Ak:CC?, 231Al:CC?, 231Am:CC?, 231An:CC?, 231Ao:CC?, 231Ap:CC?, 232Aa:???, 232Ad:???, 232Bc:???, 232Bd:???, 232Br:???, 232Ch:???, 251Aa:CCC, 251Ab:CCC, 251Bb:CCC, 251Bd:CCC, 251Ca:CCC, 251Cc:CCC, 251Cf:CCC, 251Ch:CCC, 251Dc:CCC, 251Dd:CCP, 251Dg:CCC, 251Dh:CCP, M212Aa:P??, M212Ab:P??, M212Ac:P??, M212Ad:P??, M212Ba:P??, M212Bb:P??, M212Ca:PP?, M212Cb:PPP, M212Cc:PP?, M212Cd:PP?, M212Da:P??, M212Db:P??, M212Dc:P??, M212Ea:P??, M212Eb:P??, M212Fa:P??, M212Fb:P??, M221Aa:CC?, M221Ab:CC?, M221Ac:CCC, M221Ba:CCC, M221Bb:CCC, M221Bc:CC?, M221Bd:CCC, M221Be:CC?, M221Ca:C??, M221Cb:C??, M221Dc:CCC, M221Dd:CCP

Synonymy: Piedmont/Mountain Semipermanent Impoundment, in part (Schafale and Weakley 1990)

References: Curtis 1959, Faber-Langendoen et al. 1996, Nelson and Anderson 1983, Schafale and Weakley 1990, Sytsma and Pippen 1981b

Authors: A.S. WEAKLEY/K.D. PATTERS, KP, MCS **Identifier:** A.1397

(MYRICA GALE) / CAREX STRICTA SEASONALLY FLOODED HERBACEOUS VEGETATION
(Sweet Gale) / Tussock Sedge Seasonally Flooded Herbaceous Vegetation

G? 00-08-29
S? 01-08-16

State Estimated EO's: ?—Not yet ranked in New Jersey.
State Area:

Concept: This tussock sedge meadow of northern New England and the Adirondack Mountains occurs in seasonally flooded basins or on stream or lake margins. The substrate is peat or muck of variable depth overlying mineral soil. Microtopography is characterized by tussocks, particularly when the hydroperiod is extended. Species

composition is variable but usually includes *Carex stricta, Carex comosa, Carex scoparia, Carex stipata, Carex vulpinoidea, Glyceria canadensis, Calamagrostis canadensis, Asclepias incarnata, Thelypteris palustris*, with other associates including *Eupatorium maculatum, Campanula aparinoides, Osmunda regalis, Angelica atropurpurea, Eupatorium perfoliatum, Lycopus americanus, Galium obtusum*, and others. A shrub layer is absent, but scattered shrubs may be present and vary with geography. In the northern part of the range, *Myrica gale, Ilex verticillata* and *Spiraea alba* are often present. A bryophyte layer comprised of species of *Sphagnum* may be present, including *Sphagnum magellanicum, Sphagnum girgensohnii, Sphagnum palustre*, and others.

Comments:
Range:
Other States/Provinces: CT:S?, DE:S?, MA:S?, MD:S?, ME:S?, NH:S?, NY:S?, PA:S?, RI:S?, VT:S?, WV:S?
Physiographic Province, Section, Subsection: 212Cb:CCC, 232Aa:???, M221Ac:CCC, M221Ba:CCC, M221Bb:CCC, M221Bd:CCP
Synonymy:
References: Curtis 1959, Northern Appalachian Ecology Working Group 2000, Reschke 1990
Authors: ECS **Confidence:** 3 **Identifier:** CEGL006412

Carex stricta Seasonally Flooded Herbaceous Vegetation [Placeholder]
Tussock Sedge Seasonally Flooded Herbaceous Vegetation
[Sedge Marshes (Placeholder)] **G?**
S3S4 01-08-16

State Estimated EO's: CD—Probably between 30–150 occurrences in state.
State Area: U—Estimate between 200–2,000 acres in state. Patch size probably ranges from 1/4–10 acres.

Concept: This is a placeholder for community association(s) to be developed in this alliance.
Comments:
Range:
Other States/Provinces: CT:S?, DE:S?, MA:S?, MD:S?, ME:S?, NC:S?, NH:S?, NY:S?, PA:S?, RI:S?, VA:S?, VT:S?, WV:S?
Physiographic Province, Section, Subsection: 231A:CC, 232Aa:???, M221Ac:CCC, M221Ba:CCC, M221Bb:CCC, M221Bd:CCP, M221Dc:CPP, M221Dd:CPP
Synonymy: Tussock sedge meadow (NAP), *Carex stricta* wet meadow (CAP)
References: Schafale and Weakley 1990
Authors: ECS **Confidence:** 3 **Identifier:** CEGL004121

V.A.5.N.k.7. CLADIUM MARISCOIDES SEASONALLY FLOODED HERBACEOUS ALLIANCE

Twig-rush Seasonally Flooded Herbaceous Alliance

Concept: This alliance, found in the upper midwestern and northeastern regions of the United States, contains wet meadows and interdunal wetlands where *Cladium mariscoides* is a typical dominant. In the East, this alliance is found in Coastal Plain pondshores, where *Coelorachis rugosa* is a diagnostic associate, in Coastal Plain poor fens, where *Eleocharis equisetoides* is a diagnostic associate, and in the pine barrens wet meadows, where *Danthonia sericea* and *Lophiola aurea* are diagnostic associates. In the Midwest, this type is found in the Great Lakes lakeplain, where associated species include *Carex cryptolepis, Rhynchospora alba, Juncus canadensis, Carex lasiocarpa, Calamagrostis stricta*, and *Oligoneuron riddellii (= Solidago riddellii)*. In interdunal wetlands, typical herbaceous species include *Calamagrostis canadensis, Carex* spp., *Cladium mariscoides, Eleocharis quinqueflora, Equisetum variegatum, Juncus balticus,*

Dichanthelium acuminatum, Rhynchospora capillacea, Schoenoplectus acutus (= Scirpus acutus), and *Typha* spp.

Stands in this alliance occur in low-lying, seasonally flooded basins with muck overlaying mineral soils. In the Midwest, stands can occur as wet meadows or interdunal wetlands along the Great Lakes shoreline. The substrate is 75–100% sand. Organics and silts occur in small amounts in depressions of exposed dunelands, and in larger amounts in sheltered, inland wet depressions. High concentrations of carbonate, magnesium, and calcium increase alkalinity and fertility.

Comments:

Range: This alliance is found in Delaware, New Jersey, Illinois, Indiana, Iowa, Michigan, Ohio, and Wisconsin, and in Canada, in Ontario.

Other States/Provinces: DE IL IN MI NJ OH ON WI

Physiographic Province, Section, Subsection: 212Hd:CCC, 212Hj:CCC, 212Hl:CCC, 212Ho:CCC, 212Hr:CCC, 212Hw:CCC, 212Hx:CCC, 212Ia:CCC, 212Ja:CCP, 212Jb:CCC, 212Jn:CCC, 212Oa:CCC, 212Ob:CCC, 221Aa:PPP, 221Ab:PPP, 221Ac:PPP, 221Ad:PPP, 221Al:PPP, 222Ig:CCC, 222Jg:CCC, 222Jh:CCC, 222Ji:CCC, 222Jj:CCC, 222Kg:CCC, 232Aa:CCP, **232Ac:**CCP, 232Ba:CPP, 232Bd:CPP, 251Dg:CCC, M221Dc:PPP

Synonymy:

References: Chapman et al. 1989, Faber-Langendoen et al. 1996, Hiebert et al. 1986

Authors: ECS **Identifier:** A.1368

CLADIUM MARISCOIDES—COELORACHIS RUGOSA HERBACEOUS VEGETATION

Twig-rush—Wrinkled Jointgrass Herbaceous Vegetation

[Cape May—Delmarva Depression Meadow] **G1** 97-11-18

S1 01-08-16

State Estimated EO's: A

State Area: A

Concept: This seasonally flooded, Coastal Plain, depressional wetland occurs in southern New Jersey and Delaware. The substrate is sandy loam over sandy clay loam. The vegetation is diverse with *Cladium mariscoides* arguably the most characteristic species. Herbaceous associates may include *Dichanthelium spretum (= Panicum spretum), Coelorachis rugosa, Boltonia asteroides, Eryngium aquaticum, Rhexia virginica, Fimbristylis autumnalis, Scleria reticularis, Sclerolepis uniflora*, and others.

Comments:

Range:

Other States/Provinces: DE:S?

Physiographic Province, Section, Subsection: 232Ab:CCC

Synonymy:

References: Bowman 2000

Authors: ECS **Confidence:** 3 **Identifier:** CEGL006332

CLADIUM MARISCOIDES—DANTHONIA SERICEA—LOPHIOLA AUREA HERBACEOUS VEGETATION

Twig-rush—Silky Oatgrass—Golden Crest Herbaceous Vegetation

[Pine Barrens Savanna] **G2** 98-12-10

S1S2 01-08-16

State Estimated EO's: B—Estimate 10–20 occurrences in state.

State Area: A—Estimate less than 100 acres in state. Patch size ranges from 1/4–10 acres.

Concept: This herbaceous wetland community is restricted to the New Jersey Pine Barrens. This community occurs in the floodplains of streams, generally along old stream channels in the pine barrens. Occurrences are usually separated from the river proper

by a well-developed levee. Barren areas of bog iron are present in some occurrences, often in the bed of the old stream channel. Areas within some occurrences are influenced by ground water seepage, usually adjacent to a Chamaecyparis thyoides swamp. Flooding from the adjacent river occurs periodically, generally first at the downstream end. The physiognomy is somewhat variable, but is generally characterized by coarse mid-height grasses, sedges, and herbs. Some areas, generally those of slightly higher elevations, also support a sparse tree or shrub cover, which grades into pitch pine—heath lowland vegetation. At the wetter end of the hydrologic gradient, this vegetation becomes predominantly hydrophytic, dominated by rushes, sedges, and aquatic herbs. Characteristic species include *Narthecium americanum, Lophiola aurea, Danthonia sericea*, and *Muhlenbergia torreyana*. Associates are varied among occurrences but often include *Orontium aquaticum, Eriocaulon decangulare, Calamagrostis coarctata (= Calamagrostis cinnoides), Eragrostis pilosa, Dulichium arundinaceum, Rhynchospora glomerata, Rhynchospora gracilenta, Juncus acuminatus, Triantha racemosa (= Tofieldia racemosa), Sarracenia purpurea, Iris prismatica, Rhododendron viscosum, Dichanthelium dichotomum, Vaccinium macrocarpon, Pogonia ophioglossoides*, and *Calopogon tuberosus*.

Comments:
Range:
Other States/Provinces:
Physiographic Province, Section, Subsection: 232A:CC
Synonymy:
References:
Authors: ECS **Confidence:** 2 **Identifier:** CEGL006222

V.A.5.N.k.66. JUNCUS DICHOTOMUS SEASONALLY FLOODED HERBACEOUS ALLIANCE

Forked Rush Seasonally Flooded Herbaceous Alliance

Concept: This alliance encompasses rush-dominated vegetation of small, interdunal, very shallow, seasonally flooded basins. The 'dune swales' of the related *Vaccinium macrocarpon* Saturated Dwarf-shrubland Alliance (A.1094) (Sneddon et al. 1994) share some species with this alliance, such as *Lycopodiella appressa, Utricularia subulata*, and *Drosera intermedia*. However, sedges and rushes rather than *Vaccinium macrocarpon* are more characteristic of the *Juncus dichotomus* Seasonally Flooded Herbaceous Alliance (A.1427). Associates include *Andropogon virginicus, Juncus dichotomus, Juncus canadensis, Juncus biflorus, Juncus scirpoides, Drosera intermedia, Fimbristylis autumnalis, Linum medium, Schoenoplectus pungens (= Scirpus pungens)*, and *Solidago sempervirens*. Soils are characterized by a shallow organic layer overlying sands. The water table is generally high (from 10-50 cm from the surface). This alliance occurs in close association, and often as part of a finely textured mosaic, with the III.A.2.N.i *Morella cerifera* Saturated Shrubland Alliance (A.1906) and the III.B.2.N.e *Morella (cerifera, pensylvanica)—Vaccinium formosum* Shrubland Alliance (A.1010) (which is not known from south of Maryland). Further data analysis will be required to establish the status and range of this alliance with greater confidence.

Comments:
Range: This alliance is found in Maryland, New Jersey, and Virginia, and possibly Delaware (?).
Other States/Provinces: DE? MD NJ VA
Physiographic Province, Section, Subsection: 232Bz:CCC, 232Ch:C??, 232Ci:C??

Synonymy:
References: Hill 1986, Jones 1992a, Sneddon et al. 1994, Sneddon et al. 1996, Tyndall and Levy 1978
Authors: ECS, MP, ECS **Identifier:** A.1427

JUNCUS DICHOTOMUS—DROSERA INTERMEDIA HERBACEOUS VEGETATION
Forked Rush—Water Sundew Herbaceous Vegetation
[Forked Rush Dune Swale] **G?**
S? 01-08-16

State Estimated EO's: ?—Not yet ranked in New Jersey.
State Area:

Concept: This interdunal swale community of the Atlantic coast (Chesapeake and Delaware Bay drainages) occurs in small, shallow, seasonally flooded depressions. Soils are characterized by a shallow organic layer overlying sands. Sedges and rushes such as *Juncus dichotomus, Juncus canadensis, Juncus biflorus, Juncus scirpoides*, and *Fimbristylis castanea* are typically dominant. Common associates include *Drosera intermedia, Linum medium, Schoenoplectus pungens (= Scirpus pungens), Lycopodiella appressa, Utricularia subulata, Andropogon virginicus*, and *Solidago sempervirens*.
Comments: This community occurs in close association, and often as part of a finely textured mosaic, with *Myrica (cerifera, pensylvanica)—Vaccinium formosum* Shrubland (CEGL003906) and *Morella cerifera / Hydrocotyle spp*. Shrubland (CEGL003840).
Range:
Other States/Provinces: DE?, MD:S?, VA:S?
Physiographic Province, Section, Subsection: 232Bz:CCC, 232C:C?
Synonymy: Sand Bog, Bog, Bog community (Hill 1986), *Andropogon* community? (Tyndall and Levy 1978), interdunal wetlands? (Jones 1992a)
References: Hill 1986, Jones 1992a, Sneddon et al. 1994, Sneddon et al. 1996, The Nature Conservancy (TNC) 1995c, Tyndall and Levy 1978
Authors: ECS **Confidence:** 2 **Identifier:** CEGL004111

V.A.5.N.k.18. PANICUM HEMITOMON SEASONALLY FLOODED TEMPERATE HERBACEOUS ALLIANCE

Maidencane Seasonally Flooded Temperate Herbaceous Alliance

Concept: This alliance encompasses temperate wetland communities dominated by *Panicum hemitomon*, including various ponds, lakes, depression meadows, flatwoods ponds, pineland ponds, interdune swales, etc. It is wide-ranging, occurring throughout the eastern and southeastern Coastal Plain. It is very common in Florida, where it occurs in thousands of lakes and ponds. It is also common in Louisiana.
Comments: Data exists for some South Carolina depression meadows. Formation placement is problematic; some *Panicum hemitomon* communities have temporarily flooded hydrology, while others are semipermanently flooded. It may be desirable to split this and recognize two or more categories.
Range: This alliance is found in Alabama, Delaware, Florida, Georgia, Louisiana, Maryland, Mississippi, New Jersey, North Carolina, South Carolina, Tennessee, Texas, and possibly Virginia (?).
Other States/Provinces: AL DE FL GA LA MD MS NC NJ SC TN TX VA?
Physiographic Province, Section, Subsection: 222Eb:CCC, 231Cc:C??, 231Cd:C??, 231Fb:CCC, **232A:**CC, 232Ba:CCP, 232Bb:CCP, 232Bc:CCP, 232Be:CCP, 232Bf:CCC, 232Bg:CCC, 232Bh:CCP, 232Bi:CCP, 232Bj:CCC, 232Bk:CCC, 232Bl:CCP, 232Bm:CCP, 232Bn:CCP, 232Bo:CCP, 232Bq:CCC, 232Bv:CCC, 232Cb:CCC, 232Cc:CCC, 232Cd:CCC,

232Cf:CCP, 232Ch:CCC, 232Da:CCP, 232Db:CCP, 232Dc:CCC, 232Ea:CCC, 232Eb:CCC, 232Fa:CCC, 232Fb:CCC, 232Fe:CCP, 234Aa:CCC

Synonymy: IIE1f. Coastal Plain Small Depression Pond Complex, in part (Allard 1990); Small Depression Pond, in part (Schafale and Weakley 1990); Depression Meadow, in part (Nelson 1986); Basin Marsh, in part (Florida Natural Areas Inventory 1992a); Flatwoods Pond, in part (Smith 1996a); Flatwoods Pond, in part (Smith 1996b)

References: Florida Natural Areas Inventory 1992a, Florida Natural Areas Inventory 1992b, Nelson 1986, Schafale and Weakley 1990, Smith 1996a, Smith 1996b, Wolfe 1990

Authors: D.J. ALLARD, MP, SCS **Identifier:** A.1379

PANICUM HEMITOMON—PANICUM VERRUCOSUM HERBACEOUS VEGETATION

Maidencane—Warty Panicgrass Herbaceous Vegetation

G? 97-08-28
S1S2 01-08-16

State Estimated EO's: AB—Estimate 1–15 occurrences.
State Area: A

Concept: This seasonally flooded, Coastal Plain wetland occurs in small topographically isolated basins on the central Atlantic Coastal Plain. This vegetation usually occurs on the relatively higher, outer margin of the basin, occurring on loamy sands. *Panicum hemitomon* is the dominant species, often occurring in monotypic stands. Associates that may occur at low cover include *Cladium mariscoides, Dulichium arundinaceum, Panicum verrucosum, Dichanthelium spretum (= Panicum spretum), Carex striata, Juncus repens*, and *Eleocharis quadrangulata*. Occasional seedlings of *Liquidambar styraciflua, Acer rubrum*, and *Diospyros virginiana* also may occur.

Comments:

Range:

Other States/Provinces: DE:S?, MD:S?

Physiographic Province, Section, Subsection: 232A:CC, 232B:CC

Synonymy:

References: Berdine and Gould 1999, Bowman 2000

Authors: ECS **Confidence:** 3 **Identifier:** CEGL006338

V.A.5.N.k.1. PANICUM VIRGATUM SEASONALLY FLOODED HERBACEOUS ALLIANCE

Switchgrass Seasonally Flooded Herbaceous Alliance

Concept: This alliance encompasses seasonally flooded areas dominated by the nominal species. Associated species include *Spartina patens, Juncus canadensis, Solidago sempervirens, Festuca rubra, Eleocharis palustris, Toxicodendron radicans, Linum medium, Carex albolutescens*, and *Euthamia caroliniana (= Euthamia tenuifolia)*. This community is variable in its expression but is typically dominated by 40-85% cover of *Panicum virgatum* and occurs in larger interdunal depressions (up to 0.5 hectare). Variability occurs in the cover of *Panicum virgatum* and the richness of associated species. In some Coastal Plain cases, *Morella cerifera (= Myrica cerifera)* or *Baccharis halimifolia* will constitute less than 10% shrub cover. The vegetation is similar in total floristic composition to *Morella*-dominated shrublands, but shrubs are generally lacking or at very low cover and grasses are much more abundant. In most cases, shrub coverage is much less or none and other herbs codominate. When *Panicum virgatum* is not as dense, it is most often associated with *Schoenoplectus pungens (= Scirpus pungens), Spartina patens*, or a mixture of both. Soils are characterized by a shallow organic layer (usually a few centimeters in depth) overlying loamy sand or sand. The water table is at or close to the surface in the spring. These depressions are saturated or seasonally flooded and

somewhat poorly drained. This alliance also includes areas in Arkansas and other interior states where streams cross prairies and natural depressions in prairies. Many other associations remain to be described in this alliance, and its complete range of variation described.

Comments:

Range: This alliance is found in Arkansas, Kentucky, Delaware, Maryland, New Jersey, New York, and possibly in North Carolina (?), Oklahoma (?), Tennessee (?), and Virginia (?).

Other States/Provinces: AR DE KY MD NC NJ? NY OK? TN? VA?

Physiographic Province, Section, Subsection: 231Da:CP?, 231Dc:CP?, 231Eb:C??, 231Ga:CC?, 231Gb:CC?, 231Gc:CCC, 232Aa:CCC, 232Ad:CC?, 232Bz:CCC, 232Cb:C??, 232Ch:C??, 232Ci:C??, 234Ae:CCC, M231Aa:???, M231Ab:???, M231Ac:???, M231Ad:???

Synonymy: P5A4aI2a. *Panicum virgatum* (Foti et al. 1994); Fresh marsh, in part (Hill 1986); mesic shrub community, in part (Higgins et al. 1971); Freshwater marsh, in part (Fender 1937); *Panicum virgatum* Wetland Association, in part (Heckscher et al. 1995)

References: D. Zollner pers. comm., Fender 1937, Foti et al. 1994, Heckscher et al. 1995, Higgins et al. 1971, Hill 1986, J. Campbell pers. comm., Sneddon et al. 1996

Authors: ECS, JT, ECS **Identifier:** A.1362

PANICUM VIRGATUM—SPARTINA PATENS HERBACEOUS VEGETATION

Switchgrass—Saltmeadow Cordgrass Herbaceous Vegetation

G?

S? 01-08-16

State Estimated EO's: ?—Not yet ranked in New Jersey.

State Area:

Concept: This community is characterized by seasonally flooded basins landward of maritime backdunes. This medium-tall grassland community is strongly dominated by *Panicum virgatum*. The vegetation is similar in total floristic composition to the *Morella (cerifera, pensylvanica)—Vaccinium formosum* Shrubland (CEGL003906), but shrubs are generally lacking or at very low cover and grasses are much more abundant. Associated species include *Spartina patens, Juncus canadensis, Solidago sempervirens, Festuca rubra, Eleocharis palustris, Toxicodendron radicans, Linum medium, Carex albolutescens*, and *Euthamia caroliniana (= Euthamia tenuifolia)*. This community is variable in its expression but is typically dominated by 40–85% cover of *Panicum virgatum* and occurs in larger interdunal depressions (up to one-half hectare). Variability occurs in the cover of *Panicum virgatum* and the richness of associated species. In some cases, *Morella cerifera (= Myrica cerifera)* or *Baccharis halimifolia* will constitute less than 10% shrub cover. In most cases, shrub coverage is much less or none and other herbs codominate. When *Panicum virgatum* is not as dense, it is most often associated with an even mixture of *Schoenoplectus pungens (= Scirpus pungens)* or *Spartina patens*. Soils are characterized by a shallow organic layer (usually a few centimeters in depth) overlying loamy sand or sand. The water table is at or close to the surface in the spring. Freshwater maintains these depressions as saturated or seasonally flooded and somewhat poorly drained. The range of this vegetation is poorly known due to the low confidence of the classification. The community apparently occurs in New Jersey, Delaware, Maryland, and may extend to North Carolina, but the full range will require further study.

Comments:

Range:

Other States/Provinces: DE:S?, MD:S?, NC:S?, NJ?, NY:S?, VA?

Physiographic Province, Section, Subsection: 232Aa:CCC, 232Bz:CCC, 232Ci:C??

Synonymy: Fresh marsh community, in part (Hill 1986), Mesic shrub community, in part (Higgins et al. 1971), Freshwater marsh, in part (Fender 1937), *Panicum virgatum*

Wetland Association, in part (Heckscher et al. 1995), Montane Wet Grassland, Switchgrass Subtype (M. Schafale pers. comm.)

References: Fender 1937, Heckscher et al. 1995, Higgins et al. 1971, Hill 1986, M. Schafale pers. comm., Schafale and Weakley 1990, Sneddon et al. 1996

Authors: ECS **Confidence:** 2 **Identifier:** CEGL004129

V.A.5.N.k.23. RHYNCHOSPORA SPP.—PANICUM (RIGIDULUM, VERRUCOSUM)—RHEXIA VIRGINICA SEASONALLY FLOODED HERBACEOUS ALLIANCE

Beaksedge species—(Redtop Panicgrass, Warty Panicgrass)—Virginia Meadow-beauty Seasonally Flooded Herbaceous Alliance

Concept: 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. Abundant species in this alliance include the graminoids *Calamagrostis canadensis, Carex* spp., *Carex scoparia, Cladium mariscoides, Eleocharis melanocarpa, Fimbristylis autumnalis, Juncus* spp., *Rhynchospora capitellata, Rhynchospora scirpoides*, and *Schoenoplectus hallii (= Scirpus hallii)*. Some prominent forbs include *Ludwigia* spp., *Rhexia mariana*, and *Rhexia virginica*. Other species that may occur are *Agalinis purpurea, Dulichium arundinaceum, Eleocharis melanocarpa, Eleocharis obtusa, Eleocharis palustris (= Eleocharis smallii), Eupatorium perfoliatum, Euthamia caroliniana (= Euthamia tenuifolia), Fimbristylis autumnalis, Fuirena squarrosa, Hypericum boreale, Juncus effusus, Lobelia canbyi, Rhynchospora corniculata, Rhynchospora glomerata, Rhynchospora macrostachya, Rhynchospora perplexa, Rotala ramosior, Scirpus cyperinus, Spiraea alba, Spiraea tomentosa, Stachys hyssopifolia, Triadenum virginicum, Viola lanceolata*, and *Xyris difformis*. 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 V.A.5.N.k *Juncus repens—Eleocharis microcarpa* Seasonally Flooded Herbaceous Alliance (A.1376).

Comments:

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

Other States/Provinces: AL? DE GA IN KY? MA MD MI NH? NJ NS NY ON RI SC? TN VA WI

Physiographic Province, Section, Subsection: 212C:CP, 212D:CP, 212Hu:CCC, 212Hv:CCP, 212Hx:CCC, 212Ka:C??, 221Aa:CCP, 221Ab:CCP, 221Ac:CCP, 221Ad:CCP, **221Ae:**CC?, 221Af:CCP, 221Ag:CCP, 221Ai:CCP, 221Al:CCP, **221Ba:**CPP, 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, 232Cb:CCC, 232Ch:CCC, M221Ab:CCC

Synonymy:

References: Brodowicz 1989, Faber-Langendoen et al. 1996, Keddy and Sharp 1989

Authors: MP, ECS **Identifier:** A.1384

RHEXIA VIRGINICA—PANICUM VERRUCOSUM HERBACEOUS VEGETATION

Virginia Meadow-beauty—Warty Panicgrass Herbaceous Vegetation

[Coastal Plain Muck Pondshore]

G2G3 98-12-14

S1S3 01-08-16

State Estimated EO's: AC

State Area: A

Concept: This Coastal Plain pondshore community commonly occurs in coastal Massachusetts discontinuously south to Delaware. It occurs on the broad margins of shallow groundwater basins, but is also occurs on the protected shoreline inlets of deeper ponds in New York. The substrate is variable, ranging from loamy sand, sandy loam, or sand with an organic layer from 0 to greater than 20 cm in depth. Characteristic species include *Rhexia virginica, Cyperus dentatus, Juncus canadensis, Viola lanceolata, Juncus pelocarpus, Gratiola aurea, Rhynchospora capitellata, Euthamia caroliniana (= Euthamia tenuifolia), Drosera intermedia, Hypericum mutilum, Coreopsis rosea, Scleria reticularis, Panicum verrucosum, Xyris torta, Lachnanthes caroliana, Rhynchospora scirpoides, Fuirena squarrosa*, and *Rhynchospora macrostachya*.

Comments: A related type of vegetation that may be included within this association is a seasonally flooded herbaceous type occurring in the wettest portion of an isolated groundwater pond on the Maryland coastal plain. The vegetation is dominated by *Leersia hexandra*, with other associates occurring at low cover including *Scleria reticularis, Eleocharis macrostachya, Dichanthelium spretum (= Panicum spretum)*, and *Fimbristylis autumnalis* (Berdine and Gould 1999).

Range:
Other States/Provinces: DE:S?, MA:S?, NH?, NY:S?, RI?
Physiographic Province, Section, Subsection: 221A:CC, **232Ac:**CCC, 232B:CP
Synonymy: *Leersia hexandra* Herbaceous Vegetation (Berdine and Gould 1999)
References: Berdine and Gould 1999, Tyndall et al. 1990
Authors: ECS **Confidence:** 1 **Identifier:** CEGL006264

V.A.5.N.k.25. SCIRPUS CYPERINUS SEASONALLY FLOODED HERBACEOUS ALLIANCE

Woolgrass Bulrush Seasonally Flooded Herbaceous Alliance

Concept: 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 pylaesii, 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.

Comments:

Range: This alliance is documented from the Southern Blue Ridge of North Carolina, the Interior Low Plateau of Tennessee and other states, the 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, and Mid-Atlantic Coastal Plain).

Other States/Provinces: AL CT DE GA IN KY MA MD? ME NC NH NJ NY PA RI SC? TN VA VT WV

Physiographic Province, Section, Subsection: 222Eb:CCC, 231Bc:CCC, 232:C, M221Dc:CCC

Synonymy: IIE1g. Interior Vernal Pool Complex, in part (Allard 1990); Upland Pool, in part (Schafale and Weakley 1990); *Scirpus cyperinus-Dulichium* Pond (Newell and Peet 1995); Shallow emergent marsh (Cowardin et al. 1979)

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

Authors: ECS, MOD. ECS/SCS, MP, SCS **Identifier:** A.1386

Scirpus cyperinus Seasonally Flooded Herbaceous Vegetation
Woolgrass Bulrush Seasonally Flooded Herbaceous Vegetation

G?
S? 01-08-16

State Estimated EO's: ?—Not yet ranked in New Jersey.
State Area:

Concept: Seasonally flooded marshes dominated or characterized by *Scirpus cyperinus*. Composition is variable. Associates include *Glyceria* spp., *Thelypteris palustris*, as well as other species of *Scirpus* including *Scirpus microcarpus (= Scirpus rubrotinctus)* and *Scirpus atrovirens*.
Comments:
Range:
Other States/Provinces: CT:S?, DE:S?, MA:S?, MD?, ME:S?, NH:S?, NY:S?, PA:S?, RI:S?, VA:S?, VT:S?, WV:S?
Physiographic Province, Section, Subsection: 232:C
Synonymy: Shallow emergent marsh (Cowardin et al. 1979)
References: Cowardin et al. 1979
Authors: ECS **Confidence:** 3 **Identifier:** CEGL006349

V.A.5.N.k.29. SPARTINA PATENS SEASONALLY FLOODED HERBACEOUS ALLIANCE
Saltmeadow Cordgrass Seasonally Flooded Herbaceous Alliance

Concept: This alliance consists of seasonally flooded (non-tidal) wetlands dominated by *Spartina patens*, occurring from northeastern United States south and west to Tamaulipas, Mexico.
Comments:
Range: This alliance is found in Florida, Louisiana, North Carolina, Texas, New York, Virginia, and possibly in Georgia (?), South Carolina (?), Connecticut (?), Delaware (?), Massachusetts (?), Maryland (?), New Jersey (?), Rhode Island (?), and Tamaulipas (?), Mexico.
Other States/Provinces: AL CT? DE? FL GA? LA MA? MD? MXTM? NC NJ? NY RI? SC? TX VA
Physiographic Province, Section, Subsection: 221A:PP, 231Fb:CCC, 232Aa:CCC, 232Bz:CCC, 232Ci:CCC, 232Dc:CCC, 232Eb:CCC, 255Dc:CCC
Synonymy: Maritime Wet Grassland, in part (Schafale and Weakley 1990)
References: Schafale and Weakley 1990
Authors: ECS, JT, ECS **Identifier:** A.1390

Spartina patens—Eleocharis parvula Herbaceous Vegetation
Saltmeadow Cordgrass—Dwarf Spikerush Herbaceous Vegetation

G?
S1S2 01-08-16

State Estimated EO's: AB—Probably less than 15 occurrences, perhaps less than 5.
State Area: A—Small patch community, patches less than 1 acre in size.

Concept: This brackish, interdunal swale community of the northeastern coast occurs in low areas behind primary or secondary sand dunes. The substrate is sand with little or no organic accumulation. The water source for this wetland community is variable, including seasonally high groundwater table and sporadic tidal overwash, resulting in widely variable salinity levels. The dominant species is generally *Spartina patens*, with other characteristic species including *Eleocharis parvula, Schoenoplectus pungens (= Scirpus*

pungens), Cyperus polystachyos, and *Juncus articulatus*. Other associates may be present, depending on salinity and hydrology, including *Leptochloa fusca ssp. fascicularis (= Diplachne maritima), Schoenoplectus maritimus (= Scirpus maritimus), Juncus ambiguus (= Juncus bufonius var. halophila), Juncus scirpoides, Ptilimnium capillaceum, Rumex maritimus, Symphyotrichum subulatum (= Aster subulatus), Chenopodium rubrum, Pluchea odorata, Hibiscus moscheutos ssp. moscheutos (= Hibiscus palustris), Polygonum ramosissimum*, and *Iva frutescens*.

Comments:
Range:
Other States/Provinces: CT?, DE?, MA?, MD?, NJ?, NY:S?, RI?, VA:S?
Physiographic Province, Section, Subsection: 221A:PP, 232Aa:CCC, 232Bz:CCC
Synonymy:
References:
Authors: D. Hunt, ECS **Confidence:** 2 **Identifier:** CEGL006342

V.A.5.N.l. Semipermanently flooded temperate or subpolar grassland

V.A.5.N.l.16. SCHOENOPLECTUS ACUTUS—(SCHOENOPLECTUS TABERNAEMONTANI) SEMIPERMANENTLY FLOODED HERBACEOUS ALLIANCE

Hardstem Bulrush—(Softstem Bulrush) Semipermanently Flooded Herbaceous Alliance

Concept: This alliance is found in the midwestern and western United States and central Canada. Vegetation is characterized by medium to tall graminoids which typically range from 1 to over 2 m. The vegetation is moderately dense to dense. Some stands are heavily dominated by one or two *Scirpus* species while others have several graminoids common throughout the stand. The most abundant species are typically *Schoenoplectus acutus (= Scirpus acutus), Schoenoplectus fluviatilis (= Scirpus fluviatilis)*, and *Schoenoplectus tabernaemontani (= Scirpus tabernaemontani)*. Species composition and abundance can vary from year to year depending mostly on water level fluctuations. In most years, typical species include *Lemna* spp., *Phragmites australis, Schoenoplectus americanus (= Scirpus americanus)* (in alkaline stands), *Triglochin maritima* (in alkaline stands), *Typha latifolia*, and *Utricularia macrorhiza*. *Potamogeton* spp. often occur in the deeper parts of stands of this alliance and where emergent species are not densely packed. Shrubs, such as *Salix* spp., are not common but may become established in shallow water areas. During droughts, species more tolerant of low water, such as *Polygonum amphibium*, may invade and alter the species composition of stands of this alliance.
Stands of this alliance are flooded for most or all of the growing season. Stands can have water from 0 (exposed soil) to approximately 1.5 m deep, but usually are less than 1 m. Within a stand, water levels can vary by up to 1 m during the year. The water can be fresh to mildly saline throughout most of this alliance's range; however, in the Nebraska Sandhills, some stands occur in moderately alkaline water. Across the range of this alliance, soils are deep, poorly drained, muck, peat, or mineral.

Comments:
Range: This alliance is found in Nebraska, Iowa, South Dakota, North Dakota, Minnesota, California, Oregon, Washington, Idaho, and Montana, and in Canada in British Columbia, southern Manitoba, and northwestern Ontario. It is also known from Connecticut, Delaware, Massachusetts, Maryland, Maine, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, Virginia, and West Virginia.
Other States/Provinces: CA CT DE IA ID MA MB MD ME MN MT ND NH NJ NV? NY ON OR PA RI SD VA VT WA WV WY
Physiographic Province, Section, Subsection: 212Aa:C??, 212Ab:C??, 212Ba:C??, 212Bb:C??, 212Ca:CC?, 212Cb:CCC, 212Da:C??, 212Db:C??, 212Dc:C??, 212Ea:CP?, 212Eb:CP?,

212Ec:CPP, 212Ed:CPP, 212Fa:C??, 212Fb:C??, 212Fc:C??, 212Ga:CPP, 212Gb:CP?, 212La:CPP, 221Aa:CC?, 221Ab:CC?, 221Ac:CC?, 221Ad:CC?, **221Ae:**CCC, 221Af:CC?, 221Ag:CC?, 221Ah:CC?, 221Ai:CC?, 221Aj:CC?, 221Ak:CC?, 221Al:CC?, **221Ba:**CCC, 221Bb:CC?, 221Bc:CC?, 221Db:C??, 221Ea:C??, 221Fa:C??, 221Ja:C??, 221Jc:C??, 222Ia:C??, 222Ib:C??, 222Ic:C??, 222Id:C??, 222Ie:C??, 222If:C??, 222Lc:CCC, 231Aa:P??, 231Ae:P??, 231Af:P??, 231Ak:P??, 231Al:P??, 231Am:P??, 231An:P??, 231Ao:P??, 231Ap:P??, 232Ad:C??, 232Bc:C??, 232Bd:C??, 232Br:C??, 232Ch:C??, 232Cj:C??, 242A:CC, 251Aa:CCC, 251Bb:CCC, 251Be:CCC, 262A:CC, 322A:CC, 331D:CC, 331F:CC, 331G:CC, 331H:CC, 332C:CC, 341C:CC, 342A:CC, 342B:CC, 342C:CC, 342D:CC, 342F:CC, 342H:CC, 342I:CC, M212Aa:P??, M212Ab:P??, M212Ac:P??, M212Ad:P??, M212Ba:P??, M212Bb:P??, M212Ca:PP?, M212Cb:PPP, M212Cc:PP?, M212Cd:PP?, M212Da:P??, M212Db:P??, M212Dc:P??, M212Ea:P??, M212Eb:P??, M212Fa:P??, M212Fb:P??, M221Aa:CC?, M221Ab:CCC, M221Ba:C??, M221Bd:C??, M221Be:C??, M221Ca:C??, M221Cb:C??, M221Cc:C??, M221Cd:C??, M221Da:C??, M221Db:C??, M221Dc:C??, M242A:CC, M242B:CC, M242C:CC, M261C:CC, M262A:CC, M262B:CC, M331A:CC, M331D:CC, M332B:CC, M332D:CC, M332E:CC, M332G:CC, M333A:CC, M333B:CC, M333C:CC, M333D:CC

Synonymy: Hardstem Bulrush Herbaceous Vegetation (Christy et al. 1998); Semipermanent ponds and lakes, slightly brackish, deep-marsh zone (Stewart and Kantrud 1971); Sandhills Marsh and Alkaline Sandhills Marsh (Steinauer 1989)

References: Christy et al. 1998, Faber-Langendoen et al. 1996, Faber-Langendoen et al. 1997, Hansen et al. 1991, Hansen et al. 1995, Kunze 1994, Steinauer 1989, Stewart and Kantrud 1971, Tolstead 1942, Weaver 1960

Authors: MCS, MOD. M.S. REID, MP, MCS **Identifier:** A.1443

SCHOENOPLECTUS (TABERNAEMONTANI, ACUTUS) EASTERN HERBACEOUS VEGETATION
(Softstem Bulrush, Hardstem Bulrush) Eastern Herbaceous Vegetation
[Bulrush Deepwater Marsh] **G?**
S2S4 01-08-16

State Estimated EO's: CD—Estimate 25 to >100 occurrences.
State Area: B—Estimate 50–1,500 acres in state. Patch size range from 1/2–25 acres.

Concept: This variable deepwater marsh community of the northeastern United States and adjacent Canadian provinces occurs in a variety of wetland settings including basins, ditches, and shores of ponds, lakes, rivers, and streams. The vegetation occurs in deep water that is present in all but the driest of conditions. Seasonal spring flooding and heavy rainstorms provide nutrient input. The substrate is deep muck overlying mineral soil. The vegetation is dominated by bulrushes and robust graminoids including *Schoenoplectus acutus (= Scirpus acutus), Schoenoplectus tabernaemontani (= Scirpus tabernaemontani), Schoenoplectus americanus (= Scirpus americanus), Carex aquatilis, Carex utriculata, Thelypteris palustris, Asclepias incarnata, Impatiens capensis, Sagittaria latifolia, Scutellaria lateriflora, Sparganium eurycarpum*, and others.

Comments:

Range:

Other States/Provinces: CT:S?, DE:S?, MA:S?, MD:S?, ME:S?, NH:S?, NY:S?, PA:S?, RI:S?, VA:S?, VT:S?, WV:S?

Physiographic Province, Section, Subsection: 212Cb:CCC, **221**:P, 231:P, **232**:C, M212:P, M221Ab:CCC

Synonymy: Spring swamp (Hill 1923), Bulrush marsh (CAP) (Hill 1923)

References: Hill 1923, Northern Appalachian Ecology Working Group 2000

Authors: ECS **Confidence:** 3 **Identifier:** CEGL006275

SCHOENOPLECTUS ACUTUS—CAREX LASIOCARPA HERBACEOUS VEGETATION
Hardstem Bulrush—Wiregrass Sedge Herbaceous Vegetation
[Calcareous Scirpus acutus Marsh] **G1G2** 98-01-23
S1S2 01-08-16

State Estimated EO's: AB
State Area: A—Probably 100 acres or less in state. Patch sizes range from 1/4 acre to 5 acres.

Concept: This association occurs in standing water on the shores of lakes in limestone regions, and is dominated by the tall bulrush *Schoenoplectus acutus (= Scirpus acutus)*. Associates include *Carex lasiocarpa, Typha angustifolia, Lysimachia thyrsiflora*, and *Schoenoplectus tabernaemontani (= Scirpus tabernaemontani)*. Aquatic plants such as *Utricularia minor, Utricularia intermedia, Lemna* spp., and *Menyanthes trifoliata* often form an 'understory' below the bulrushes and cattails. This vegetation is currently known from Connecticut and New Jersey and is possibly present in the limestone regions of Massachusetts, New York, and Pennsylvania.
Comments:
Range: Potential range inferred from ecoregion occurrence.
Other States/Provinces: CT:S?, MA?, NY?, PA?
Physiographic Province, Section, Subsection: 221Ae:CCC, **221Ba:**CCC
Synonymy:
References:
Authors: ECS **Confidence:** 3 **Identifier:** CEGL006358

V.A.5.N.l.9. TYPHA (ANGUSTIFOLIA, LATIFOLIA)—(SCHOENOPLECTUS SPP.) SEMIPERMANENTLY FLOODED HERBACEOUS ALLIANCE

(Narrowleaf Cattail, Broadleaf Cattail)—(Clubrush species) Semipermanently Flooded Herbaceous Alliance

Concept: This alliance, found in virtually every state in the United States and probably most Canadian provinces, contains stands dominated by *Typha angustifolia* and/or *Typha latifolia*, either alone or in combination with other tall emergent marsh species. Associated species vary widely; in the Midwest they include many sedges such as *Carex aquatilis, Carex rostrata, Carex pellita (= Carex lanuginosa)*, bulrushes such as *Schoenoplectus americanus (= Scirpus americanus), Schoenoplectus acutus (= Scirpus acutus)*, and *Schoenoplectus heterochaetus (= Scirpus heterochaetus)*, and broad-leaved herbs such as *Thelypteris palustris, Asclepias incarnata, Impatiens capensis, Sagittaria latifolia, Scutellaria lateriflora, Sparganium eurycarpum, Hibiscus moscheutos*, and *Verbena hastata*. Floating aquatics such as *Lemna minor* may predominate in deeper zones.
This alliance is found most commonly along lake margins and in shallow basins, and occasionally in river backwaters. Lacustrine cattail marshes typically have a muck-bottom zone bordering the shoreline, where cattails are rooted in the bottom substrate, and a floating mat zone, where the roots grow suspended in a buoyant peaty mat. *Typha angustifolia* can grow in deeper water compared to *Typha latifolia*, although both species reach maximum growth at a water depth of 50 cm. *Typha* often occurs in pure stands, and can colonize areas recently exposed by either natural or human causes. *Lythrum salicaria*, an exotic species from Europe, has become a common associate of many eastern *Typha* marshes. In the Southeast, this alliance is widespread and currently representative of a wide variety of mixed marshes with no clear dominants. Vegetation in this alliance may be natural or semi-natural and includes mixed stands of the nominal species, as well as essentially monospecific stands of *Typha latifolia*. These monospecific stands occur especially in artificial wetlands, such as borrow pits or ponds. This alliance occurs on hydric soils in wetlands, ditches, ponds, lakes, and

rivers, as well as on shorelines and streambanks. Inundation is commonly 3–6 dm (1–2 feet) in depth. These marshes have hydric soils and are flooded with water levels ranging from several centimeters to more than 1 m for a significant part of the growing season. Occurrences may display areas of open water, but emergent vegetation dominates (80% cover). Seasonal flooding during winter and spring or flooding during heavy rains help maintain these marshes by causing water exchange which replenishes freshwater and circulates nutrients and organic debris. Soils which support this community can be mineral or organic but are saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions in the upper part. Vegetative diversity and density is highly variable in response to water depth, water chemistry, and natural forces.

Comments: It has been suggested that mixed emergent marshes tend to occur on harder pond, lake, or river bottoms and are less likely to contain a peaty mat with its diverse mixture of forbs (MNNHP 1993). Alliances that describe marshes dominated by mixed emergents other than cattails and the associates listed above include the V.A.5.N.l *Phragmites australis* Semipermanently Flooded Herbaceous Alliance (A.1431), the V.A.5.N.l *Schoenoplectus acutus—(Schoenoplectus tabernaemontani)* Semipermanently Flooded Herbaceous Alliance (A.1443), the V.A.5.N.l *Schoenoplectus americanus* Semipermanently Flooded Herbaceous Alliance (A.1432), and the V.A.5.N.l *Zizania (aquatica, palustris)* Semipermanently Flooded Herbaceous Alliance (A.1441). In shallow flooded conditions this alliance grades into the V.A.5.N.k *Typha spp.—(Schoenoplectus spp., Juncus spp.)* Seasonally Flooded Herbaceous Alliance (A.1394), as well as V.A.5.N.k *Schoenoplectus fluviatilis* Seasonally Flooded Herbaceous Alliance (A.1387). *Typha latifolia* can hybridize with *Typha angustifolia*, and the hybrid, *Typha X glauca*, may be more invasive of disturbed areas than the parent species. In the West, some studies have classified marshes dominated by *Typha domingensis* as phases of *Typha latifolia* marshes. This alliance now includes wetland communities dominated by *Typha latifolia*, often in disturbed or sedimented situations. The concept and distribution of this alliance in the Southeast needs reassessment. Many of the presettlement occurrences of this alliance have been drained and converted to cropland or destroyed by siltation, which greatly accelerates the natural successional process from shallow inundation to moist soil. *Lythrum salicaria* is an aggressive exotic species that threatens this vegetation type in Canada, the Northeast, and more recently in the Midwest.

Range: This alliance is found in virtually every state in the United States and is likely to be found in most Canadian provinces. In the southeastern United States, it is found in Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, and Virginia.

Other States/Provinces: AL AR AZ BC? CA CO CT DE FL? GA IA ID IL IN KS KY LA MA MB MD ME MI MN MO MS MT NC ND NE NH NJ NM NV NY OH OK ON OR PA QC RI SC SD TN TX UT VA VT WA WI WV WY

Physiographic Province, Section, Subsection: 212Aa:C??, 212Ab:C??, 212Ba:C??, 212Bb:C??, 212Ca:CC?, 212Cb:CCC, 212Da:C??, 212Db:C??, 212Dc:C??, 212Ea:CCC, 212Ec:CCP, 212Ed:CCP, 212Ee:CCP, 212Fa:C??, 212Fb:C??, 212Fc:C??, 212Fd:C??, 212Ga:CPP, 212Gb:CP?, 212Ha:CCP, 212Hb:CCP, 212He:CCC, 212Hh:CCP, 212Hi:CCP, 212Hj:CCC, 212Hk:CCC, 212Hl:CCC, 212Hm:CCP, 212Hn:CCP, 212Ho:CCC, 212Hp:CCP, 212Hq:CCP, 212Hr:CCP, 212Hs:CCP, 212Ht:CCC, 212Hu:CCC, 212Hv:CCC, 212Hw:CCC, 212Hx:CCC, 212Hy:CCP, 212Ia:CCC, 212Ib:CCP, 212Ja:CCC, 212Jb:CCP, 212Jc:CCP, 212Jf:CCP, 212Jj:CCP, 212Jk:CCP, 212Jl:CCP, 212Jm:CCP, 212Jn:CCC, 212Jo:CCP, 212Jr:CCC, 212Ka:CCP, 212Kb:CCC, 212La:CPP, 212Lb:CPP, 212Lc:CPP, 212Ld:CPP, 212Ma:CPP, 212Mb:CPP, 212Na:CCP, 212Nb:CCP, 212Nc:CCC, 212Nd:CCP, 212Oa:CCC, 212Ob:CCC, 212Pa:CCC, 212Pb:CCC, 221Aa:C??, 221Ab:C??, 221Ac:C??, 221Ad:C??, **221Ae:**C??, 221Af:C??, 221Ag:C??, 221Ah:C??, 221Ai:C??, 221Aj:C??,

221Ak:C??, 221Al:C??, **221Am:**C??, **221Ba:**C??, 221Bb:C??, 221Bc:C??, **221Bd:**C??, **221Da:**C??, 221Db:C??, **221Dc:**C??, 221Ea:CC?, 221Eb:CC?, 221Ec:CCC, 221Eg:CCC, 221Fa:C??, 221Fb:C??, 221H:CC, 221Ja:CC?, 221Jc:CC?, 222Ab:CCC, 222Ag:CCC, 222Ah:CCC, 222Am:CCC, 222An:CCC, 222Cf:CCP, 222Cg:CCP, 222D:CC, 222Eb:CCC, 222Eg:CCP, 222Eh:CCP, 222F:CC, 222Ge:CCC, 222Ha:CCC, 222Hb:CCC, 222Ia:CCC, 222Ib:CCP, 222Ic:CC?, 222Id:CC?, 222Ie:CCP, 222If:CCC, 222Ja:CCC, 222Jc:CCC, 222Je:CCC, 222Jg:CCC, 222Jh:CCC, 222Ji:CCC, 222Jj:CCC, 222Kd:CCC, 222Ke:CCC, 222Kf:CCC, 222Kg:CCC, 222Kj:CCC, 222Lc:CCC, 222Mb:CCC, 222Mc:CCC, 222Md:CCC, 222Me:CCC, 222Na:CCC, 222Q:CC, 231Aa:C??, 231Ae:C??, 231Af:C??, 231Ak:C??, 231Al:C??, 231Am:C??, 231An:C??, 231Ao:C??, 231Ap:C??, 231C:CC, 231Fb:CCC, 231Ga:CCC, 231Gb:CCC, 231Gc:CCC, 232Aa:C??, **232Ac:**C??, 232Ad:C??, 232Bc:C??, 232Bd:C??, 232Br:C??, 232Ce:CCC, 232Ch:CC?, 232Cj:CC?, 234A:PP, 251Aa:CCC, 251Ab:CCC, 251Ba:CCC, 251Bb:CCC, 251Bd:CCC, 251Be:CCC, 251Cb:CCC, 251Cc:CCC, 251Cd:CC?, 251Cf:CCC, 251Cg:CCC, 251Ch:CCC, 251Cm:CCC, 251Cp:CCC, 251Dc:CCC, 251Dg:CCC, 251Ea:CCC, 251Eb:CCC, 251Ed:CCC, 251F:CC, 255Aa:CCC, 255C:CC, 255Da:CCC, 255Dc:CCC, 261A:CC, 262A:CC, 263A:CC, 311A:CC, 331C:CC, 331F:CP, 331H:CC, 331I:CC, 332A:CP, 332B:C?, 332C:CC, 332D:CP, 332E:CC, 341C:CC, 342:C, M212Aa:C??, M212Ab:C??, M212Ac:C??, M212Ad:C??, M212Ba:C??, M212Bb:C??, M212Ca:CP?, M212Cb:CPP, M212Cc:CP?, M212Cd:CP?, M212Da:C??, M212Db:C??, M212Dc:C??, M212Ea:C??, M212Eb:C??, M212Fa:C??, M212Fb:C??, M221Aa:CCC, M221Ab:CCC, M221Ac:CCC, M221Ad:CCC, M221Ba:CCC, M221Bb:CCC, M221Bc:CCC, M221Bd:CCC, M221Be:CCC, M221Bf:CCC, M221Ca:C??, M221Cb:C??, M221Cc:C??, M221Cd:C??, M221Da:CCC, M221Db:CCP, M221Dc:CCP, M221Dd:CCP, M222Aa:CCC, M222Ab:CCC, M231Aa:CCC, M231Ab:CCC, M231Ac:CCC, M231Ad:CCC, M331F:CC, M331I:CC, M333C:CC, M334A:CC

Synonymy: Cattail Marsh, in part (Foti 1994b); *Typha domingensis* herbaceous series, in part (Hoagland 1997); *Typha latifolia* herbaceous series, in part (Hoagland 1997); P5A4bII2a. *Typha latifolia* (Foti et al. 1994); L5D2aI2a. *Typha latifolia* (Foti et al. 1994); *Typha latifolia* Habitat Type (Hansen et al. 1995); Cattail Series, in part (Sawyer and Keeler-Wolf 1995)

References: Anderson 1982, Apfelbaum 1985, Bundy et al. 1996, Bunin 1985, Christy 1973, Eggers and Reed 1987, Faber-Langendoen et al. 1996, Foti 1994b, Foti et al. 1994, Grace and Wetzel 1981, Great Plains Flora Association 1986, Hansen et al. 1991, Hansen et al. 1995, Hoagland 1997, Jones and Walford 1995, Kittel et al. 1996, Kittel et al. 1999, Komarkova 1976, Komarkova 1986, Kovalchik 1993, Lindauer 1978, Lindauer and Christy 1972, Masek 1979, McEachern 1979, Minnesota Natural Heritage Program (MNNHP) 1993, Mitsch and Gosselink 1993, Mohlenbrock 1959, Muldavin et al. 1993b, Padgett et al. 1989, Sawyer and Keeler-Wolf 1995, Segadas-Vianna 1951, Simkins 1931, TNC 1995b, Tolstead 1942, Wharton 1978, Youngblood et al. 1985a

Authors: MCS, MOD. M.S. REID, MP, MCS **Identifier:** A.1436

TYPHA (ANGUSTIFOLIA, LATIFOLIA)—(SCHOENOPLECTUS SPP.) EASTERN HERBACEOUS VEGETATION
(Narrowleaf Cattail, Broadleaf Cattail)—(Clubrush species) Eastern Herbaceous Vegetation
[Cattail Marsh] **G5**

S5 01-08-16

State Estimated EO's: D—Estimate >100 occurrences in state.
State Area: U—Patch sizes probably range from 1/4–80 acres.

Concept: Graminoid marshes dominated by *Typha angustifolia* and/or *Typha latifolia*, either alone or in combination with other tall emergent marsh species. Associated species vary widely; sedges such as *Carex aquatilis, Carex lurida, Carex rostrata, Carex pellita (= Carex lanuginosa)*, and bulrushes such as *Schoenoplectus americanus (= Scirpus americanus)* and *Schoenoplectus acutus (= Scirpus acutus)* occur. Broad-leaved herbs include *Thelypteris*

palustris, Asclepias incarnata, Impatiens capensis, Sagittaria latifolia, Scutellaria lateriflora, Sparganium eurycarpum, and *Verbena hastata*. Floating aquatics, such as *Lemna minor*, may predominate in deeper zones. These communities occur along lake margins and in shallow basins, and river backwaters. Lacustrine cattail marshes typically have a muck-bottom zone bordering the shoreline, where cattails are rooted in the bottom substrate, and a floating mat zone, where the roots grow suspended in a buoyant peaty mat. *Typha angustifolia* can grow in deeper water compared to *Typha latifolia*, although both species reach maximum growth at a water depth of 50 cm (Grace and Wetzel 1981). *Typha* often occurs in pure stands and can colonize areas recently exposed by either natural or human causes.

Comments:

Range:

Other States/Provinces: CT:S?, DE:S?, MA:S?, MD:S?, ME:S?, NC:S?, NH:S?, NY:S?, PA:S?, RI:S?, VA:S?, VT:S?, WV:S?

Physiographic Province, Section, Subsection: 212Cb:CCC, **221**:C, 222:C, 231:C, M212:C, M221Aa:CCC, M221Ab:CCC, M221Ac:CCC, M221Ad:CCC, M221Ba:CCC, M221Bb:CCC, M221Bc:CCC, M221Bd:CCC, M221Be:CCC, M221Bf:CCC, M221Da:CCC, M221Db:CCP, M221Dc:CCP, M221Dd:CCP

Synonymy: Cattail marsh (CAP)

References: Grace and Wetzel 1981, Northern Appalachian Ecology Working Group 2000

Authors: ECS **Confidence:** 3 **Identifier:** CEGL006153

V.A.5.N.m. Saturated temperate or subpolar grassland

V.A.5.N.m.1. CLADIUM MARISCOIDES SATURATED HERBACEOUS ALLIANCE

Twig-rush Saturated Herbaceous Alliance

Concept: This alliance currently includes a variety of palustrine herbaceous vegetation dominated by *Cladium mariscoides* in combination with other grasses and sedges; shrubs typically account for less than 25% cover in these communities. This alliance contains a diversity of vegetation types, with variable species composition. Associations in this alliance include sea-level fens of the mid-Atlantic coast, high-elevation (4200 feet) fens over mafic geology in the Southern Blue Ridge, communities of floodplains, streams, and stream channels in the New Jersey Pine Barrens, certain Coastal Plain pondshore communities in Delaware, and Coastal Plain poor fens in Rhode Island and New York.

Comments:

Range: This alliance is found in North Carolina, Connecticut, Delaware, Maryland, New Jersey, New York, Rhode Island, Virginia, and possibly West Virginia (?).

Other States/Provinces: CT DE MA MD? NC NJ? NY RI VA

Physiographic Province, Section, Subsection: 221A:CC, 221Db:C??, 222If:CCC, 232Ad:CCC, 232Br:CCC, M221Dc:CCC

Synonymy: IIE1b. Calcareous Fen Complex, in part (Allard 1990); Southern Appalachian Fen (Schafale and Weakley 1990)

References: , Allard 1990, Richardson and Gibbons 1993, Schafale and Weakley 1990, Weakley and Schafale 1994

Authors: K.D. PATTERSON, KP, ECS **Identifier:** A.1447

CLADIUM MARISCOIDES—DROSERA INTERMEDIA—ELEOCHARIS ROSTELLATA HERBACEOUS VEGETATION
Twig-rush—Water Sundew—Beaked Spikerush Herbaceous Vegetation
[Sea Level Fen] **G1** 97-11-14
S? 01-08-16

State Estimated EO's: ?—Not yet ranked in New Jersey.
State Area:

Concept: This fen vegetation of the central Atlantic Coastal Plain is an acidic groundwater seepage-fed wetland occurring at the edge of salt marshes adjacent to sandy or gravelly slopes. Although its association with salt marshes is diagnostic, it is only infrequently influenced by salt or brackish overwash during unusually high tides. The physiognomy is variable, in general is dominated by herbs, with some scattered shrubs or short trees. The diagnostic species include *Cladium mariscoides, Rhynchospora alba, Eleocharis rostellata, Drosera intermedia*, and *Schoenoplectus pungens (= Scirpus pungens)*. Other associated species may include *Symphyotrichum novi-belgii (= Aster novi-belgii), Carex exilis, Carex hormathodes, Eleocharis fallax, Juncus canadensis, Juncus pelocarpus, Lysimachia terrestris, Rosa palustris, Schoenoplectus americanus (= Scirpus americanus), Sanguisorba canadensis, Eriocaulon decangulare, Teucrium canadense*, and *Vaccinium macrocarpon*. Woody species occurring at low cover may include *Morella pensylvanica (= Myrica pensylvanica), Baccharis halimifolia, Juniperus virginiana, Iva frutescens*, and in the southern portion of the range, *Morella cerifera (= Myrica cerifera)*.
Comments:
Range:
Other States/Provinces: CT:S?, DE:S?, MA:S?, MD?, NJ?, NY:S?, RI:S?, VA:S?
Physiographic Province, Section, Subsection: 221A:CC, **232A:**CC, 232B:CC
Synonymy: *Myrica cerifera / Eriocaulon decangulare—Eleocharis rostellata* Sparse Shrubland (Grossman et al. 1994)
References: Grossman et al. 1994, Ludwig 1995
Authors: ECS **Confidence:** 1 **Identifier:** CEGL006310

V.A.5.N.m.10. DESCHAMPSIA CAESPITOSA SATURATED HERBACEOUS ALLIANCE
Tufted Hairgrass Saturated Herbaceous Alliance

Concept: This wetland alliance occurs in subalpine meadows and alpine tundra in the Rocky Mountains and in New Jersey. In the Rocky Mountains, stands are found in shallow depressions and on flat surfaces where snow accumulates in the winter and melts relatively late in the spring. Soil texture varies among stands, but soils are poorly drained and remain saturated throughout the growing season. Topographic position accounts for the poorly drained soils. *Deschampsia caespitosa* and *Caltha leptosepala* codominate the herbaceous layer. *Pedicularis groenlandica, Polygonum bistorta*, and *Veronica wormskjoldii* and a number of *Carex* species are common associates. In the Kittattiny Mountains in New Jersey, similar vegetation occurs in a forb-dominated, acidic, seepage wetland community that is confined to a single location. On this site, seepage water is diverted to the surface by a clay fragipan. The herbaceous layer is dominated by *Deschampsia caespitosa, Carex bromoides, Carex atlantica ssp. atlantica (= Carex atlantica var. incomperta)*, and *Claytonia virginica var. hammondiae*. Diagnostic of this wetland alliance is the perennially saturated soils dominated or codominated by the bunchgrass *Deschampsia caespitosa*.
Comments: The temporarily flooded, seasonally flooded, and saturated *Deschampsia caespitosa* alliances are weakly separated hydrologically. Descriptions for the three alliances which occur in the literature are poorly differentiated with regards to soils,

hydrology, and vegetation. Associations from the Rocky Mountains and New Jersey are included in the *Deschampsia caespitosa* Saturated Herbaceous Alliance (A.1456). Further review of the literature is needed to determine if the disjunct associations should remain in the same alliance.

Range: This alliance occurs in the Rocky Mountains in Colorado, Montana, and Idaho, as well as in northern New Jersey. Stands of the alliance may also be found in other western states and in Pennsylvania and New York, but have not been documented.

Other States/Provinces: CO ID MD? MT NJ NY? PA?

Physiographic Province, Section, Subsection: 221Bd:PPP, M221A:??, M332A:CC, M332E:CC, M332F:CC, M332G:CC, M333D:CC

Synonymy:

References: Bonham 1966, Bonham and Ward 1970, Breden 1989, Cooper and Lesica 1992, Cooper et al. 1997, Hess 1981, Hess and Wasser 1982, Johnson 1970, Johnston 1987, Komarkova 1986, May 1973, Osburn 1958a, Snyder 1992, Welsh et al. 1987, Wilson 1969

Authors: M. DAMM, WCS **Identifier:** A.1456

DESCHAMPSIA CAESPITOSA—SYMPLOCARPUS FOETIDUS HERBACEOUS VEGETATION

Tufted Hairgrass—Skunk-cabbage Herbaceous Vegetation

[Inland Acidic Seep Community] **G1** 99-03-22

S1 01-08-16

State Estimated EO's: A—3 patches as 1 occurrence.

State Area: A—Less than 10 acres in state. Patches range from 1/4–1 acre.

Concept: This forb-dominated acidic seepage wetland community is known from a single location on the Kittattiny Mountains of northern New Jersey where seepage water is diverted to the surface by a clay fragipan. The pH ranges from 4.5-4.7. The vegetation is dominated by *Deschampsia caespitosa, Carex bromoides, Carex atlantica ssp. atlantica (= Carex atlantica var. incomperta)*, and *Claytonia virginica var. hammondiae*. Other less frequent associates include *Symplocarpus foetidus, Osmunda cinnamomea, Maianthemum canadense, Viola cucullata, Kalmia angustifolia, Coptis trifolia*, and *Solidago puberula*. A bryophyte layer dominated by *Sphagnum* species included the following species: *Sphagnum bartlettianum, Sphagnum henryense, Sphagnum palustre*, and *Sphagnum recurvum*. *Cerastium biebersteinii*, an exotic of European origin, also occurs in this vegetation.

Comments:

Range: This community is known only from the Kittatinny Mountains of northern New Jersey. There is a slight potential that it may also occur in eastern Pennsylvania, southeastern New York, or in central Maryland.

Other States/Provinces: MD?, NY?, PA?

Physiographic Province, Section, Subsection: M221A:??, **221Bd:CCC**

Synonymy:

References: Breden 1989, Snyder 1992

Authors: ECS **Confidence:** 2 **Identifier:** CEGL006101

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

V.A.5.N.n.6. PANICUM VIRGATUM TIDAL HERBACEOUS ALLIANCE

Switchgrass Tidal Herbaceous Alliance

Concept: This alliance consists of brackish to oligohaline tidal marshes dominated by *Panicum virgatum*. Hydrology of this alliance is irregularly tidally inundated, usually occurring above *Juncus roemerianus* and other tidal marshes, and at the conceptual edge of tidal and upland communities. Associated species in the northern part of the alliance's range include *Spartina pectinata, Agrostis stolonifera, Cladium mariscoides, Schoenoplectus americanus (= Scirpus americanus), Solidago sempervirens, Baccharis halimifolia*, and *Tripsacum dactyloides*. Associates in the southern portion of the range include *Cladium mariscus ssp. jamaicense, Sagittaria lancifolia*, and *Spartina cynosuroides*.

Comments: This vegetation typically intergrades with the *Baccharis halimifolia—Iva frutescens* Tidal Shrubland Alliance (A.1023); its status as a distinct alliance may require further study. More information is needed on its expression and extent in the southeastern U.S.

Range: This alliance is found in Alabama, Mississippi, Connecticut, Delaware, Massachusetts, Maryland, New Jersey, New York, Rhode Island, and Virginia, and possibly in Florida (?) and Louisiana (?).

Other States/Provinces: AL CT DE FL? LA? MA MD MS NJ NY RI

Physiographic Province, Section, Subsection: 221Aa:CCP, 221Ab:CCP, 221Ac:CCP, 221Ad:CCP, **221Ae:**CC?, 221Ak:CCP, 232Aa:CCC, **232Ac:**CC?, 232Ad:CC?, 232Bc:CCP, 232Bd:CC?, 232Bz:CCC, 232Cb:CCP, 232Ce:CCP, 232Ch:CC?, 232Ci:CCP, 232Cj:CC?, 232Dc:CCC

Synonymy:

References: Sneddon et al. 1994

Authors: ECS, JT, ECS **Identifier:** A.1476

PANICUM VIRGATUM—CAREX SILICEA HERBACEOUS VEGETATION

Switchgrass—Beach Sedge Herbaceous Vegetation

[Brackish Meadow] **G?**

S2S3 01-08-16

State Estimated EO's: C

State Area: B—Patch size ranges 1–5 acres.

Concept: This brackish meadow of the northeastern Atlantic coast occurs at the higher reaches of salt marshes and is irregularly flooded by the tides. It occurs on sandy substrates. The dominant species are *Panicum virgatum, Spartina patens (= var. monogyna)*, and *Carex silicea*. Other associates may include *Schizachyrium scoparium, Andropogon gerardii, Distichlis spicata, Setaria parviflora, Eragrostis spectabilis, Elymus virginicus, Panicum amarum, Cladium mariscoides, Cyperus polystachyos, Cyperus dentatus, Schoenoplectus pungens (= Scirpus pungens), Juncus gerardii, Polygala verticillata, Solidago sempervirens, Euthamia caroliniana (= Euthamia tenuifolia), Agalinis maritima, Sabatia* spp., *Artemisia campestris ssp. caudata, Aster* spp., *Liatris scariosa var. novae-angliae, Fimbristylis castanea*, and *Oenothera oakesiana (= Oenothera parviflora var. oakesiana)*. Shrubs that may occur at low cover include *Morella pensylvanica (= Myrica pensylvanica), Baccharis halimifolia*, and *Prunus maritima*.

Comments:

Range:

Other States/Provinces: CT:S?, DE:S?, MA:S?, MD:S?, NY:S?, RI:S?

Physiographic Province, Section, Subsection: 221A:CC, 232Aa:CCC, 232B:CC, 232C:CC

Synonymy:
References:
Authors: ECS **Confidence:** 2 **Identifier:** CEGL006150

V.A.5.N.n.8. SCHOENOPLECTUS PUNGENS TIDAL HERBACEOUS ALLIANCE
Threesquare Tidal Herbaceous Alliance

Concept: This alliance is characterized by seasonally wet maritime interdunal depressions, commonly known as interdunal swales. It includes irregularly flooded brackish marshes dominated or codominated by *Schoenoplectus pungens (= Scirpus pungens)*, and peaty oligohaline marshes (salt 0.5-5 ppt) dominated by *Schoenoplectus pungens*, sometimes with *Osmunda regalis var. spectabilis* as codominant. Other associated species can include *Spartina patens, Juncus canadensis, Juncus scirpoides, Hydrocotyle umbellata*, and *Eleocharis parvula*. The general aspect and species composition of this vegetation is variable, not only among occurrences, but also over the course of the growing season. This alliance occurs in the Atlantic Coastal Plain from North Carolina north to Massachusetts.
Comments:
Range: This alliance occurs in the Atlantic Coastal Plain from North Carolina north to Massachusetts. It is found in North Carolina, Connecticut, Delaware, Maryland, Massachusetts, New Jersey, and Virginia.
Other States/Provinces: CT DE MA MD NC NH NJ NY RI VA
Physiographic Province, Section, Subsection: 221Ab:CCC, 221Ac:CCC, 221Ad:CCP, 221Ak:CCC, 232Aa:CCC, 232Ch:CCC
Synonymy:
References: Higgins et al. 1971, Hill 1986
Authors: A.S. WEAKLEY, JT, ECS **Identifier:** A.1478

SCHOENOPLECTUS PUNGENS TIDAL HERBACEOUS VEGETATION
Threesquare Tidal Herbaceous Vegetation
[Brackish Tidal Marsh] **G?**
S1S3 01-08-16

State Estimated EO's: C
State Area: A—Patches linear, <1 acre—0.7km long x 50m wide is largest.

Concept: This association occurs on mid-tidal sandy/gravelly rivershores where wave and ice scour can have a significant influence on the year-to-year appearance of the vegetation. This vegetation often occurs in nearly pure stands but can be intermixed with *Spartina alterniflora* or *Spartina cynosuroides* in slightly brackish areas.
Comments: The nominal species has long been known as *Scirpus americanus*.
Range:
Other States/Provinces: CT:S?, DE:S?, MA:S?, MD:S?, VA:S?
Physiographic Province, Section, Subsection: 221A:CC, 232Ch:CCC
Synonymy:
References: Caldwell 1990
Authors: ECS **Confidence:** 3 **Identifier:** CEGL004188

V.A.5.N.n.1. SPARTINA ALTERNIFLORA TIDAL HERBACEOUS ALLIANCE
Saltmarsh Cordgrass Tidal Herbaceous Alliance

Concept: This alliance includes various tidal marshes dominated by *Spartina alterniflora*. The hydrology is usually regularly tidally flooded. In the northern part of its range, southern Maine to Cape Hatteras, North Carolina, this alliance is generally limited to the zone between mean sea level and the mean high water level. The habitat occurs in protected inlets behind barrier beaches or in drowned river valleys. Peat depth ranges from a few feet, if the community formed over a mud flat, to 80 feet in drowned river valleys. *Spartina alterniflora* is limited to the low marsh zone by moderate salinity; it can withstand longer submergence than other salt marsh grasses, but still requires periodic exposure of the substrate. It also requires moderately high levels of iron (7–15 ppm). This community is commonly known as the 'low salt marsh,' occurring as a tall grassland strongly dominated by *Spartina alterniflora*. There is little variation in vascular plant species composition across the range. It occurs in nearly pure stands, with occasional low growing species such as *Spergularia salina (= Spergularia marina), Salicornia* spp., *Suaeda maritima*, and seaweeds such as *Ulva lactuca* and other algae such as *Fucus vesiculosus* and *Ascophyllum nodosum*, which grow at the bases of the *Spartina* plants. Herbs of *Salicornia virginica* and *Salicornia bigelovii* can be quite common mixed in with the *Spartina*, often becoming more apparent later in the growing season. *Limonium carolinianum* is another characteristic herb, but only as scattered individuals. More detailed information is needed on the variability of the alliance in the southern parts of its range.

Comments:

Range: This alliance is found in Alabama, Florida, Georgia, Louisiana, Mississippi, North Carolina, South Carolina, Texas, Connecticut, Delaware, Massachusetts, Maine, Maryland, New Hampshire, New Jersey, Rhode Island, and Virginia.

Other States/Provinces: AL CT DE FL GA LA MA MD ME MS NC NH NJ NY RI SC TX VA

Physiographic Province, Section, Subsection: 212Cb:PPP, 212Db:PPP, 212Dc:PPP, 221Aa:CCP, 221Ab:CCP, 221Ac:CCP, 221Ad:CCC, **221Ae:**CCP, 221Aj:CCP, 221Ak:CCP, **221Dc:**CPP, 231Fb:CCC, 232Aa:CCP, **232Ac:**CCC, 232Ad:CCP, 232Bb:CCP, 232Bc:CCP, 232Bd:CCP, 232Br:CCC, 232Bt:CCC, 232Bx:CCC, 232Bz:CCC, 232Cb:CCC, 232Ce:CCC, 232Ch:CCC, 232Ci:CCC, 232Cj:CCC, 232Db:CCP, 232Dc:CCC, 232Dd:CCC, 232De:CCP, 232Eb:CCC, 232Ed:CCC, 232Ee:CCC, 232Gb:CPP, 255Da:CC?, 255Dc:CCC

Synonymy: Tidal Marsh, in part (Florida Natural Areas Inventory 1992a); Saline Marsh, in part (Wieland 1994a); Saline Marsh, in part (Wieland 1994b); Salt Marsh (Schafale and Weakley 1990); Salt Marsh (Smith 1996a); Salt Marsh (Nelson 1986); Brackish Marsh, in part (Nelson 1986); Smooth Cordgrass Series, in part (Diamond 1993); Smooth Cordgrass Marsh (Wharton 1978)

References: Diamond 1993, Eleuterius 1972, Florida Natural Areas Inventory 1992a, Kurz and Wagner 1957, Montague and Wiegert 1990, Nelson 1986, Odum 1988, Schafale and Weakley 1990, Smith 1996a, Tiner 1977, Wharton 1978, Wieland 1994a, Wieland 1994b

Authors: D.J. ALLARD, JT, ECS **Identifier:** A.1471

SPARTINA ALTERNIFLORA—LILAEOPSIS CHINENSIS HERBACEOUS VEGETATION
Saltmarsh Cordgrass—Marsh Grasswort Herbaceous Vegetation

G?
S3 01-08-16

State Estimated EO's: C
State Area: C—Patches <1/4-50 acres.

Concept: This association is a brackish, rather than salt, marsh dominated by *Spartina alterniflora*. This community occupies a mid-tidal position where *Spartina alterniflora* occurs with various mixtures of species such as *Spartina cynosuroides* or *Amaranthus cannabinus*. Floristically, this community differs from the other communities of this alliance in that it is brackish rather than saline, indicated by the presence of brackish indicators such as *Lilaeopsis chinensis, Eleocharis parvula, Limosella australis (= Limosella subulata)*, and possibly *Crassula aquatica*. This association grades into the *Schoenoplectus pungens* Tidal Herbaceous Alliance (A.1478) as the salinity gradient decreases into mesohaline and oligohaline waters.
Comments:
Range:
Other States/Provinces: CT:S?, DE:S?, MA:S?, MD:S?, NC:S?, NY:S?, RI:S?, SC:S?, VA:S?
Physiographic Province, Section, Subsection: 221Ad:CCC, **232Ac:**CCC, 232Bz:CCC, 232Cb:CCC
Synonymy: Brackish Marsh, Smooth Cordgrass Subtype (M. Schafale pers. comm.)
References: M. Schafale pers. comm., Nelson 1986, Schafale and Weakley 1990
Authors: ECS **Confidence:** 2 **Identifier:** CEGL004193

SPARTINA ALTERNIFLORA / (ASCOPHYLLUM NODOSUM) ACADIAN/ VIRGINIAN ZONE HERBACEOUS VEGETATION

Saltmarsh Cordgrass / (Yellow Tang) Acadian/Virginian Zone Herbaceous Vegetation [Spartina Low Salt Marsh] **G5**

S5 01-08-16

State Estimated EO's: C
State Area: E—Patches 5–5000 acres: 40000-50000 total. See Tiner: we est. no. of occurrences from 207000 acre total tidal emergent wetlands—2/3 of this are salt marshes; 120000 are salt marshes & 48000 are low marsh.

Concept: Low salt marsh of the Northeast. The community is generally limited to the zone between mean sea level and the mean high water level. The habitat occurs in protected inlets behind barrier beaches or in drowned river valleys. Peat depth ranges from a few feet, if the community formed over a mud flat, to 80 feet in drowned river valleys. *Spartina alterniflora* is limited to the low marsh zone by moderate salinity; it can withstand longer submergence than other salt marsh grasses but still requires periodic exposure of the substrate. It also requires moderately high levels of iron (7–15 ppm). This community is commonly known as the 'low salt marsh,' occurring as a tall grassland strongly dominated by *Spartina alterniflora*. There is little variation in vascular plant species composition across the range. It occurs in nearly pure stands, with occasional low-growing species such as *Spergularia salina (= Spergularia marina), Salicornia* spp., *Suaeda maritima*, and seaweeds such as *Ulva lactuca* and other algae such as *Fucus vesiculosus* and *Ascophyllum nodosum*, which grow at the bases of the *Spartina* plants (Moul 1973). Herbs of *Salicornia virginica* and *Salicornia bigelovii* can be quite common mixed in with the *Spartina*, often becoming more apparent later in the growing season. *Limonium carolinianum* is another characteristic herb but only as scattered individuals. This community occurs in estuaries from southern Maine to Cape Hatteras, North Carolina. The northern limit is determined by a slower accumulation of silt and corresponding absence of algal species (Chapman 1937). The southern limit corresponds with the southern limit of the Virginian province of the American Atlantic Temperate Region, a transitional area harboring animal species of both southern and northern affinities (Gosner 1979).

Comments: *Ascophyllum nodosum* may be sparse or absent from southern occurrences of this community, but these occurrences are placed within this type because of the associated characteristic faunal assemblage, including *Uca pugnax, Littorina saxatilis, Littorina obtusata*, and *Brachidontes demissus*.

Range:

Other States/Provinces: CT:S?, DE:S?, MA:S?, MD:S?, ME:S?, NC:S?, NH:S?, NY:S?, RI:S?, VA:S?

Physiographic Province, Section, Subsection: 221A:CC, **232Ac:**CCC, 232B:CC, 232Ch:CCC, 232Ci:CCC

Synonymy: Salt marsh, in part (Higgins et al. 1971), Salt marsh community, in part (Hill 1986), *Spartina alterniflora* community (Metzler and Barrett 1992), Salt marsh complex, low marsh (Breden 1989), *Spartina alterniflora* salt marsh (Clancy 1993), Low salt marsh (Reschke 1990), Cordgrass saltmarsh community (Maine Natural Heritage Program (MENHP) 1991), Low salt marsh (Enser 1993), Low salt marsh community (Sperduto 1994), Salt Marsh, Virginian Subtype (M. Schafale pers. comm.), Salt marsh (M. Schafale pers. comm.)

References: Breden 1989, Chapman 1937, Clancy 1993, Enser 1993, Higgins et al. 1971, Hill 1986, M. Schafale pers. comm., Maine Natural Heritage Program (MENHP) 1991, Metzler and Barrett 1992, Moul 1973, Reschke 1990, Schafale and Weakley 1990, Sperduto 1994

Authors: ECS **Confidence:** 1 **Identifier:** CEGL004192

V.A.5.N.n.10. SPARTINA CYNOSUROIDES TIDAL HERBACEOUS ALLIANCE

Giant Cordgrass Tidal Herbaceous Alliance

Concept: This alliance occurs as narrow, almost pure, stands of *Spartina cynosuroides* along tidal creeks and sloughs or on levees of oligohaline tidal marshes. Some *Spartina cynosuroides* communities are nearly monospecific, while others have a diverse component of other graminoids and forbs. Associated plants include *Schoenoplectus pungens (= Scirpus pungens), Schoenoplectus robustus (= Scirpus robustus), Schoenoplectus tabernaemontani (= Scirpus validus), Pontederia cordata, Peltandra virginica, Typha domingensis*, and *Typha angustifolia*, among others. Communities in this alliance occur mainly in the mid-Atlantic states with the northern extent of distribution being southern New England.

Comments: There may be several associations, determined by salinity.

Range: Communities in this alliance occur mainly in the mid-Atlantic states with the northern extent of distribution being southern New England. It is found in Georgia, North Carolina, South Carolina, Connecticut, Delaware, Maryland, New Jersey, New York, and Virginia.

Other States/Provinces: CT DE GA MA MD NC NJ NY SC VA

Physiographic Province, Section, Subsection: 221A:??, **232A:**C?, 232Br:CCP, 232Bx:CCC, 232Bz:CCC, 232Cb:CCP, 232Ce:CCC, 232Ch:CCC, 232Ci:CCC

Synonymy: Tidal Freshwater Marsh, Oligohaline Variant (Schafale and Weakley 1990); Brackish Marsh, in part (Schafale and Weakley 1990); Brackish Marsh, in part (Nelson 1986); Brackish Marsh, in part (Wharton 1978); Big Cordgrass Community Type (Odum et al. 1984)

References: Fleming 1998, Nelson 1986, Odum 1988, Odum and Smith 1981, Odum et al. 1984, Schafale and Weakley 1990, Wharton 1978

Authors: ECS, JT, SCS **Identifier:** A.1480

Spartina cynosuroides Herbaceous Vegetation
Giant Cordgrass Herbaceous Vegetation

G4 97-08-13
S3 01-08-16

State Estimated EO's: C
State Area: C—Patch size 5–50 acres; most are 5–10 acres.

Concept: Narrow, sometimes almost pure, stands of *Spartina cynosuroides* along tidal creeks and sloughs or on levees of oligohaline tidal marshes. Some *Spartina cynosuroides* communities are nearly monospecific, while others have a diverse component of other graminoids and forbs. Associated plants include *Schoenoplectus pungens (= Scirpus robustus), Schoenoplectus robustus (= Scirpus robustus), Schoenoplectus tabernaemontani (= Scirpus validus), Pontederia cordata, Peltandra virginica, Typha domingensis*, and *Typha angustifolia* among others. Several associations may be described.
Comments:
Range:
Other States/Provinces: CT:S?, DE:S?, GA:S?, MA:S?, MD:S?, NC:S?, NY:S?, SC:S?, VA:S?
Physiographic Province, Section, Subsection: 221A:??, **232A:**C?, 232Br:CCP, 232Bx:CCC, 232Bz:CCC, 232Cb:CCP, 232Ce:CCC, 232Ch:CCC, 232Ci:CCC
Synonymy: Brackish Marsh, in part (Wharton 1978), Big Cordgrass Community Type (Odum et al. 1984)
References: Nelson 1986, Odum 1988, Odum and Smith 1981, Odum et al. 1984, Schafale and Weakley 1990, Wharton 1978
Authors: SCS **Confidence:** 2 **Identifier:** CEGL004195

V.A.5.N.n.11. SPARTINA PATENS—(DISTICHLIS SPICATA) TIDAL HERBACEOUS ALLIANCE

Saltmeadow Cordgrass—(Saltgrass) Tidal Herbaceous Alliance

Concept: This alliance is found in irregularly flooded tidal marshes along the Gulf and Atlantic coasts from Texas to Delaware. Vegetation may be strongly dominated by *Spartina patens*, or codominated by *Spartina patens and a number of other salt marsh species including Distichlis spicata, Spartina alterniflora, Vigna luteola*, and *Paspalum vaginatum*. In some associations, *Distichlis spicata, Paspalum vaginatum*, or *Limonium carolinianum* may dominate localized areas. Shrub seedlings such as *Baccharis halimifolia* and *Morella cerifera (= Myrica cerifera)* may also be present. The associated *Juncus roemerianus* Tidal Herbaceous Alliance (A.1475) often occurs as discrete patches which may reach substantial size. From Delaware south to Florida, this high salt marsh coastal community is dominated by *Spartina patens*, forming meadows at slightly higher elevations in relation to the adjacent *Spartina alterniflora* Tidal Herbaceous Alliance (A.1471). Diagnostic species for this community are *Spartina patens, Distichlis spicata, Borrichia frutescens, Kosteletzkya virginica*, and *Pluchea odorata*. From Delaware (discontinuously south to Virginia) north to the Canadian maritime provinces, this alliance is characterized by the dominance of *Spartina patens, Distichlis spicata* and *Juncus gerardii* and the presence of more northerly distributed marsh species such as *Puccinellia fasciculata, Plantago maritima*, and *Triglochin maritimum*. In New Hampshire, this alliance includes *Spartina patens*-dominated vegetation that may also be characterized by the presence of *Agrostis stolonifera, Festuca rubra, Symphyotrichum novi-belgii (= Aster novi-belgii), Hierochloe odorata, Carex paleacea*, or *Spartina pectinata*.
This alliance also includes mesohaline to oligohaline marshes of the Gulf Coast in Texas and Louisiana. In these associations, *Spartina patens* may strongly dominate, *Distichlis spicata, Spartina alterniflora*, and *Spartina patens* may codominate, *Distichlis spicata* may

form pure stands, *Paspalum vaginatum* may strongly dominate, or *Spartina patens* and *Vigna luteola* may codominate. Other characteristic species include *Juncus roemerianus, Spartina spartinae, Spartina cynosuroides* (within its range), *Schoenoplectus robustus, Schoenoplectus americanus, Sagittaria lancifolia, Phragmites australis*, and *Eragrostis* spp. Here, this alliance forms mosaics with *Spartina spartinae* and *Spartina alterniflora* marshes and saline herbaceous vegetation. Western states have a different alliance for inland situations dominated by *Distichlis spicata*, the *Distichlis spicata* Intermittently Flooded Herbaceous Alliance (A.1332).

Comments: This may represent multiple zones; more research is needed.

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

Other States/Provinces: AL CT DE FL GA LA MA MD ME MS NC NH NJ NY RI SC TX VA

Physiographic Province, Section, Subsection: 212Cb:CCC, 212Db:CPP, 221Aa:CCP, 221Ab:CCP, 221Ac:CCP, 221Ad:CCP, **221Ae:**CCP, 221Aj:CCP, 221Ak:CCC, **221Dc:**CPP, 231Fb:CCC, 232Aa:CCP, **232Ac:**CCC, 232Ad:CC?, 232Bb:CCP, 232Bc:CCP, 232Bd:CCP, 232Br:CCP, 232Bx:CCP, 232Bz:CCC, 232Cb:CCC, 232Ce:CCC, 232Ch:CCC, 232Ci:CCC, 232Cj:CCC, 232Db:CCP, 232Dc:CCC, 232Dd:CCC, 232De:CCP, 232Eb:CCC, 232Ed:CCC, 232Ee:CCC, 232Gb:CCP, 255Da:CCP, 255Dc:CCC, 315F:CC

Synonymy: Intermediate Marsh (Smith 1996a); Salt Marsh, in part (Smith 1996a); Salt Marsh, in part (Wieland 1994b); Salt Marsh, in part (Schafale and Weakley 1990); Salt Marsh, in part (Nelson 1986); Brackish Marsh, in part (Wieland 1994b); Brackish Marsh, in part (Nelson 1986); Marshhay Cordgrass Series, in part (Diamond 1993); Saltgrass-Cordgrass Series (Diamond 1993)

References: Adams 1963, Clancy 1993, Cooper and Waits 1973, Diamond 1993, Higgins et al. 1971, Hill 1986, Montague and Wiegert 1990, Nelson 1986, Odum 1988, Odum and Smith 1981, Penfound 1952, Schafale and Weakley 1990, Smith 1996a, Tiner 1977, Wieland 1994a, Wieland 1994b

Authors: A.S. WEAKLEY 9-94, MOD. J, JT, ECS **Identifier:** A.1481

SPARTINA PATENS—DISTICHLIS SPICATA—PLANTAGO MARITIMA HERBACEOUS VEGETATION
Saltmeadow Cordgrass—Saltgrass—Seaside Plantain Herbaceous Vegetation
[Spartina High Salt Marsh] **G5**
S5 01-08-16

State Estimated EO's: D—15 mega occurrences; 100 others.
State Area: D—Patch size ranges 1–5000 acres.

Concept: This high salt marsh vegetation occurs along the north Atlantic coast from Delaware (discontinuously south to Virginia) north to the Canadian maritime provinces. It occupies the zone extending from mean high tide landwards to the limit of spring tides and is subjected to irregular tidal flooding. The substrate is peat overlying mineral soil. The most characteristic and dominant species of this marsh community are *Spartina patens, Distichlis spicata* and *Juncus gerardii*. Other associates include *Limonium carolinianum, Panicum virgatum, Symphiotrichum tenuifolium (= Aster tenuifolius), Solidago sempervirens*, and a short form of *Spartina alterniflora*. At the northern end of the range, other associates include *Carex paleacea, Glaux maritima, Juncus balticus, Triglochin maritima*, and *Suaeda maritima*.

Comments:

Range:

Other States/Provinces: CT:S?, DE:S?, MA:S?, MD:S?, ME:S?, NH:S?, NY:S?, RI:S?, VA:S?

Physiographic Province, Section, Subsection: 212Cb:CCC, 221A:CC, **232Ac:**CCC, 232B:CC, 232C:CC

Synonymy:
References: Hill 1923, Maine Natural Heritage Program (MENHP) 1991, Nixon 1982, Sperduto 1997a
Authors: ECS **Confidence:** 2 **Identifier:** CEGL006006

V.A.5.N.n.2. TYPHA (ANGUSTIFOLIA, DOMINGENSIS) TIDAL HERBACEOUS ALLIANCE

(Narrowleaf Cattail, Southern Cattail) Tidal Herbaceous Alliance

Concept: Tidal marshes dominated by *Typha angustifolia* and/or *Typha domingensis*. Examples of this alliance are composed of a mixture of salt marsh and freshwater tidal marsh species. The vegetation is dense and characterized by tall graminoids such as *Typha angustifolia*, with associates including *Spartina cynosuroides, Phragmites australis* or *Schoenoplectus americanus (= Scirpus americanus), Pontederia cordata, Lilaeopsis chinensis, Hibiscus moscheutos (= Hibiscus palustris)*, and *Pluchea odorata*. Other characteristic species include *Hibiscus moscheutos, Spartina patens, Distichlis spicata, Schoenoplectus pungens (= Scirpus pungens), Lycopus americanus, Eleocharis palustris, Hydrocotyle umbellata, Eupatorium capillifolium, Ptilimnium capillaceum, Bidens* spp., and *Spartina alterniflora*. This community is typically a brackish tidal marsh occurring where water salinity ranges from 0.5-18.0 ppt. Brackish marshes are most extensive on large tidal rivers, but smaller marshes of this alliance also occur at the upper limits of larger tidal creeks. The alliance occurs along the Atlantic coast from Maine through South Carolina and along the Gulf coast in Alabama and Texas. Alabama and Texas communities occur in oligohaline tidal marshes and are dominated by *Typha domingensis*. Further research is necessary to determine the classification, and thus the range, with confidence.
Comments:
Range: The alliance occurs along the Atlantic coast from Maine through South Carolina and along the Gulf coast in Alabama and Texas.
Other States/Provinces: AL CT DE FL? MA MD ME MS? NC? NH NJ NY RI SC? TX VA
Physiographic Province, Section, Subsection: 212Cb:CCC, 212Db:CPP, 212Dc:CPP, 221Aa:PPP, 221Ab:PPP, 221Ac:PPP, 221Ad:PPP, **221Ae:**PPP, 221Aj:PPP, 221Ak:PPP, **221Ba:**P??, **221Da:**P??, **221Dc:**P??, 231Fb:CCC, 232Aa:CCC, **232Ac:**CCC, 232Ad:CCP, 232Bb:CCP, 232Bc:CCP, 232Bd:CCP, 232Br:CCP, 232Bs:CCC, 232Bz:CC?, 232Cb:CCC, 232Ch:CCC, 232Ci:CCC, 232Dd:CCC
Synonymy: Tidal Freshwater Marsh, in part (Schafale and Weakley 1990); Cattail Community Type (Odum et al. 1984); Transitional fresh marsh, in part (Hill 1986); *Typha angustifolia-Hibiscus palustris* community (Metzler and Barrett 1992); Brackish tidal marsh (Reschke 1990); Brackish tidal marsh complex (Breden 1989); Brackish tidal marsh community (Maine Natural Heritage Program (MENHP) 1991); Brackish marsh (Sperduto 1994); *Hibiscus* marsh (Cahoon and Stevenson 1986); narrowleaf cattail type (McCormick and Ashbaugh 1972); *Typha angustifolia* community (Good and Good 1975a); *Typha angustifolia* type (Ferren et al. 1981); fresh-brackish marsh (Klotz 1986)
References: Breden 1989, Cahoon and Stevenson 1986, Ferren et al. 1981, Good and Good 1975a, Hill 1986, Klotz 1986, Maine Natural Heritage Program (MENHP) 1991, McCormick and Ashbaugh 1972, Metzler and Barrett 1992, Nelson 1986, Odum et al. 1984, Reschke 1990, Schafale and Weakley 1990, Sperduto 1994
Authors: ECS/A.S. WEAKLEY, JT, ECS **Identifier:** A.1472

TYPHA ANGUSTIFOLIA—HIBISCUS MOSCHEUTOS HERBACEOUS VEGETATION
Narrowleaf Cattail—Eastern Rose-mallow Herbaceous Vegetation
[Brackish Tidal Marsh] **G?**
S4 01-08-16

State Estimated EO's: D
State Area: D—Patch size 1–50 acres.

Concept: This community is a brackish tidal marsh of the northern to central Atlantic coast, occurring along the margin of tidal rivers and at the upper margins of some high salt marshes where water salinity ranges from 0.5-18.0 ppt. Brackish marshes are most extensive on large tidal rivers, but smaller marshes of this alliance also occur at the upper limits of larger tidal creeks. The vegetation is a mixture of salt marsh and freshwater tidal marsh species, often with no single species dominant over an extensive area. The vegetation is dense and characterized by tall graminoids such as *Typha angustifolia*, with associates including *Spartina cynosuroides, Phragmites australis* or *Schoenoplectus americanus (= Scirpus americanus), Pontederia cordata, Lilaeopsis chinensis, Hibiscus moscheutos ssp. moscheutos (= Hibiscus palustris)*, and *Pluchea odorata*. Other characteristic species include *Spartina patens, Distichlis spicata, Schoenoplectus pungens (= Scirpus pungens), Lycopus americanus, Eleocharis palustris, Hydrocotyle umbellata, Eupatorium capillifolium, Ptilimnium capillaceum, Bidens* spp., and *Spartina alterniflora*. Occurrences at the northern edge of the range are also characterized by *Carex paleacea* and *Triglochin maritima*.
Comments:
Range:
Other States/Provinces: CT:S?, DE:S?, MA:S?, MD:S?, ME:S3, NC?, NH:S?, NY:S?, RI:S?, SC?, VA:S?
Physiographic Province, Section, Subsection: 212Cb:CCC, 232Aa:CCC, **232Ac:**CCC, 232B:C?, 232Cb:CCC, 232Ch:CCC, 232Ci:CCC
Synonymy: Cattail Community Type (Odum et al. 1984), Transitional fresh marsh, in part (Hill 1986), *Typha angustifolia—Hibiscus* spp. Alliance: *Typha angustifolia-Hibiscus palustris* community (Metzler and Barrett 1992), Brackish tidal marsh (Reschke 1990), Brackish tidal marsh complex (Breden 1989), Brackish tidal marsh community (Maine Natural Heritage Program (MENHP) 1991), Brackish marsh (Sperduto 1994), *Hibiscus* marsh (Cahoon and Stevenson 1986), narrowleaf cattail type (McCormick and Ashbaugh 1972), *Typha angustifolia* community (Good and Good 1975b), *Typha angustifolia* type (Ferren et al. 1981), Fresh-brackish marsh (Klotz 1986)
References: Breden 1989, Cahoon and Stevenson 1986, Ferren et al. 1981, Good and Good 1975a, Hill 1986, Klotz 1986, Maine Natural Heritage Program (MENHP) 1991, McCormick and Ashbaugh 1972, Metzler and Barrett 1992, Odum et al. 1984, Reschke 1990, Schafale and Weakley 1990, Sperduto 1994, Sperduto 1997a
Authors: ECS **Confidence:** 2 **Identifier:** CEGL004201

V.A.5.N.n.14. ZIZANIA AQUATICA TIDAL HERBACEOUS ALLIANCE
Indian Wild Rice Tidal Herbaceous Alliance

Concept: 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.

Comments:

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

Other States/Provinces: AL CT DE FL? GA? LA MA MD ME MS NC NJ NY RI SC? VA

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

Synonymy: Tidal Freshwater Marsh, in part (Schafale and Weakley 1990); Wild Rice Community Type (Odum et al. 1984)

References: Odum et al. 1984, Schafale and Weakley 1990, Wharton 1978

Authors: A.S. WEAKLEY, JT, ECS **Identifier:** A.1484

Zizania aquatica Tidal Herbaceous Vegetation

Indian Wild Rice Tidal Herbaceous Vegetation

G4? 97-08-13
S2S3 01-08-16

State Estimated EO's: C

State Area: C—Patch size 1–75 (?100) acres.

Concept: These freshwater tidal marshes are 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*.

Comments:

Range:

Other States/Provinces: AL:S?, CT:S?, DE:S?, FL?, GA?, LA:S?, MA:S?, MD:S?, ME:S?, MS:S?, NC:S?, NY:S?, RI:S?, SC?, VA:S?

Physiographic Province, Section, Subsection: 221A:CC, **232A:**CC, 232Bz:CCC, 232Cb:CCP, 232Ce:CCC, 232Ch:CCP, 232Ci:CCP, 232Cj:CCP, 232Dc:CCC

Synonymy: Wild Rice Community Type (Odum et al. 1984)

References: Barrett 1994, Ferren 1977, Good and Good 1975b, McCormick and Ashbaugh 1972, McCormick et al. 1970, Metzler and Rosza 1982, Odum et al. 1984, Schafale and Weakley 1990, Wharton 1978

Authors: ECS **Confidence:** 2 **Identifier:** CEGL004202

V.A.6.N.q. Bedrock temperate or subpolar grassland with a sparse tree layer

V.A.6.N.q.101. (JUNIPERUS VIRGINIANA) / SCHIZACHYRIUM SCOPARIUM—(BOUTELOUA CURTIPENDULA) WOODED HERBACEOUS ALLIANCE

(Eastern Red-cedar) / Little Bluestem—(Sideoats Grama) Wooded Herbaceous Alliance

Concept: Perennial grasslands (variously locally called barrens, glades, and/or prairies) dominated by *Schizachyrium scoparium*, possibly also *Bouteloua curtipendula*, with a scattered canopy of needle-leaved trees, or mixed needle-leaved evergreen and broad-leaved deciduous trees, particularly one or more of *Juniperus virginiana var. virginiana, Quercus muehlenbergii*, and/or *Quercus stellata*. Specimens of *Juniperus virginiana* are relatively short and compact. The open grown canopy oaks have short trunks, spreading limbs, and rounded crowns with many branches. These trees can be found scattered individually or in isolated clumps and patches. *Juniperus ashei* may replace *Juniperus virginiana var. virginiana* in the southwestern-most portion of the alliance's range. The subcanopy is absent or very sparse. Commonly encountered shrubs include *Cornus florida, Ulmus alata, Rhus copallinum*, and *Symphoricarpos orbiculatus*. *Toxicodendron radicans* also displays a shrubby growth form. Herbaceous cover is very uneven, ranging from very dense in some areas to absent in others. Characteristic species include *Andropogon gerardii, Bouteloua curtipendula, Schizachyrium scoparium, Sorghastrum nutans, Helianthus divaricatus, Manfreda virginica, Silphium* spp., *Liatris* spp., *Rudbeckia* spp., *Sabatia angularis*, and *Verbesina alternifolia*. In the western portion of the alliance's range, some characteristic species may include *Rudbeckia missouriensis, Draba reptans, Mentzelia oligosperma, Physalis pumila, Astragalus distortus, Erysimum capitatum, Castilleja purpurea, Lesquerella filiformis, Nothocalais cuspidata, Penstemon cobaea*, and *Clematis fremontii*. *Smilax bona-nox* and *Smilax glauca* are the most frequently encountered vines and may form dense mats when present. Aspect is variable; stands occur primarily on south- and southwest-facing slopes. Soils which support stands of this alliance are stony, shallow to moderately deep, neutral to alkaline, and primarily composed of weathered mineral matter, loess, and organic debris which collects in cracks and crevices of the bedrock. Parent material is limestone rock, cherty limestone, dolomite, or calcareous shale which is exposed at the surface, resulting in a very shallow, well-drained substrate. The soils may contain a homogenous mixture of rock fragments of various sizes. Organic matter is low, and there is little or no horizon development. These soils are nutrient poor, and are extremely susceptible to erosion, partly due to freeze-thaw and subsequent mass wasting. Although predominantly droughty and excessively drained, these sites can be seasonally wet, and water is occasionally ponded in shallow depressions.

Comments: An additional association may be required for the Southern Ridge and Valley of eastern Tennessee.

Range: This alliance is found in Alabama, Arkansas, Connecticut, Georgia, Kentucky, Oklahoma, New Jersey, New York, Pennsylvania, Tennessee, Virginia, West Virginia, Illinois, Indiana, Kansas, Missouri, Ohio, and possibly in Maryland (?), Louisiana (?) and Texas (?).

Other States/Provinces: AL AR CT GA IL IN KS KY LA? MD? MO NJ NY OH OK PA TN TX? VA WV

Physiographic Province, Section, Subsection: 221A:CC, 221Hb:CCP, 221Ja:CCP, 222Aa:CCC, 222Ab:CCC, 222Ac:CCC, 222Ad:CCC, 222Ae:CCC, 222Af:CCC, 222Ag:CCC, 222Ah:CCP, 222Aj:CCC, 222Ak:CCC, 222Al:CCC, 222Am:CCC, 222An:CC?, 222Aq:CCC, 222De:CCC, 222Df:CCC, 222Dg:CCC, 222Dh:CCC, 222Di:CCC, 222Eg:CCC, 222Ei:CCC, 222Ek:CCC, 222El:CCC, 222En:CCP, 222Eo:CCC, 222Fa:CCC, 222Fc:CCC, 222Fd:CCC, 222Fe:CCC, 231Be:CCC, 231Ce:CCC, 231Dc:CCC, 231Eb:CCC,

251Cd:CCP, 251Ce:CCP, 251Cf:CCC, 251Ci:CCC, 251Ea:CCP, 255:C, M222Aa:CCP, M222Ab:CCC, M231Aa:CCP, M231Ab:CCC, M231Ac:CCP, M231Ad:CCP

Synonymy: ID4f. Limestone Prairie, in part (Allard 1990); IE10a. Interior Upland Limestone Barren. in part? (Allard 1990); Calcareous Glade/Outcrop (Foti 1994b); Coastal Plain Limestone Glade (Foti 1994b); *Schizachyrium scoparium / Juniperus virginiana* herbaceous association, in part (Hoagland 1997)

References: Allard 1990, Carpenter 1996, DeSelm 1988, Faber-Langendoen et al. 1996, Fehrenbacher et al. 1982, Foti 1994b, Fralish 1987, Hoagland 1997, Nelson 1985, White and Madany 1978

Authors: MCS/SCS, MP, SCS **Identifier:** A.1919

JUNIPERUS VIRGINIANA / BOUTELOUA CURTIPENDULA—CAREX EBURNEA WOODED HERBACEOUS VEGETATION

Eastern Red-cedar / Sideoats Grama—Bristleleaf Sedge Wooded Herbaceous Vegetation [Limestone Woodland] **G1G2** 98-11-30 **S1** 01-08-16

State Estimated EO's: B—2 known; 5–10 max.
State Area: A—Patch size 1/2–5 acres.

Concept: This small-patch calcareous rocky summit community occurs in southern New England and portions of the northern Piedmont. Dry, south-facing slopes of calcareous bedrock support small grassland openings characterized by *Schizachyrium scoparium* and *Bouteloua curtipendula*. *Juniperus virginiana* is usually present as a stunted, sparse canopy. Other possible woody associates may include *Fraxinus americana, Ostrya virginiana*, or *Quercus muehlenbergii*. Shrubs are sparse but when present may include *Celtis occidentalis* or *Cornus alternifolia*. The herbaceous composition is quite variable among occurrences but often includes such species as *Carex eburnea, Anemone cylindrica, Solidago bicolor, Panicum virgatum, Carex pensylvanica, Lespedeza* spp., *Asclepias viridiflora, Asclepias verticillata, Muhlenbergia sobolifera, Sorghastrum nutans, Onosmodium* spp., *Packera aurea (= Senecio aureus), Packera obovata (= Senecio obovatus)*, and others. This community occurs in association with forests characterized by *Quercus muehlenbergii*.

Comments:

Range:

Other States/Provinces: CT:S?, MD?, NY:S?, PA:S?, VA?

Physiographic Province, Section, Subsection: 221A:CC

Synonymy:

References: Bartgis 1985a, Bartgis 1993, Breden 1989, Grossman et al. 1994, Smith n.d. (a)

Authors: ECS **Confidence:** 2 **Identifier:** CEGL006047

V.A.7.N.g. Medium-tall temperate or subpolar grassland with a sparse cold-deciduous shrub layer

V.A.7.N.g.1. SCHIZACHYRIUM LITTORALE SHRUB HERBACEOUS ALLIANCE

Seaside Bluestem Shrub Herbaceous Alliance

Concept: Dune grasslands dominated by *Schizachyrium littorale (= Schizachyrium scoparium ssp. littorale)*. This alliance occurs on deep well-drained sands of old leveled interdunes. It usually occurs within the influence of offshore winds and salt spray. Although highly variable in species composition, the typical expression of this alliance is characterized by a predominance (25-50% cover) of bunch grasses including *Schizachyrium littorale, Andropogon virginicus, Panicum amarum var. amarulum, Ammophila breviligulata, Dichanthelium scoparium*, and *Dichanthelium acuminatum*. Generally one or two of these species will dominate while the others occur as more infrequent, scattered clumps. Occasionally *Spartina patens*, growing in a dry 'wispy' condition, will form the dominant graminoid cover. Shrubs of *Morella pensylvanica (= Myrica pensylvanica)* are sparse, and stunted *Baccharis halimifolia* and *Diospyros virginiana* are even less frequent. Dense tangles of *Toxicodendron radicans* are very characteristic of this alliance as they sprawl over the bareground and sparse vegetation. *Rubus argutus* is also scattered throughout. Much of the remaining dry sands are exposed with sparsely distributed herbs. Characteristic herb species include *Cirsium horridulum, Solidago sempervirens, Pseudognaphalium obtusifolium (= Gnaphalium obtusifolium), Nuttallanthus canadensis, Euthamia caroliniana (= Euthamia tenuifolia), Oenothera humifusa*, and *Diodia teres*. This vegetation is related to maritime grasslands of New England and New York. Further analysis is required to determine the classification, and thus the range, with confidence.

Comments:

Range: This vegetation is related to maritime grasslands of New England and New York. This alliance is found in North Carolina, Maryland, New Jersey, and Virginia, and elsewhere.

Other States/Provinces: DE MA MD ME NC? NJ NY VA

Physiographic Province, Section, Subsection: 221Aa:CCP, 221Ab:CCP, 221Ac:CCP, 221Ad:CCP, 221Ak:CCC, **232A:**CP, 232Bb:CC?, 232Bc:CCP, 232Bd:CCP, 232Bx:CCP, 232Bz:CCC, 232Ch:CCP, 232Ci:CCC, 255:P

Synonymy:

References: Higgins et al. 1971, Hill 1986, Sneddon et al. 1996

Authors: A.S. WEAKLEY, JT, ECS **Identifier:** A.1533

MORELLA PENSYLVANICA / SCHIZACHYRIUM LITTORALE—EUPATORIUM HYSSOPIFOLIUM SHRUB HERBACEOUS VEGETATION

Northern Bayberry / Seaside Bluestem—Hyssopleaf Thoroughwort Shrub Herbaceous Vegetation

[Chesapeake Bay Sandplain Grassland] **G2** 98-12-02
S2? 01-08-16

State Estimated EO's: C

State Area: B—Patch size 1/4–5 acres.

Concept: Mid-Atlantic maritime grasslands. This community occurs on deep well-drained sands of old leveled interdunes. It usually occurs within the influence of offshore winds and salt spray. Although highly variable in species composition, the typical expression of this community is characterized by a predominance (25-50% cover) of bunch grasses including *Schizachyrium littorale (= Schizachyrium scoparium ssp. littorale), Andropogon virginicus, Panicum amarum var. amarulum, Ammophila breviligulata, Dichanthelium scoparium*, and *Dichanthelium acuminatum*. Generally one or two of these species will

dominate while the others occur as more infrequent, scattered clumps. Occasionally *Spartina patens*, growing in a dry 'wispy' condition, will form the dominant graminoid cover. Shrubs of *Morella pensylvanica (= Myrica pensylvanica)* are sparse and stunted *Baccharis halimifolia* and *Diospyros virginiana* are even less frequent. Dense tangles of *Toxicodendron radicans* are very characteristic of this community as they sprawl over the bare ground and sparse vegetation. *Rubus argutus* is also scattered throughout. Much of the remaining dry sands are exposed with sparsely distributed herbs. Characteristic herb species include *Cirsium horridulum, Solidago sempervirens, Pseudognaphalium obtusifolium (= Gnaphalium obtusifolium), Nuttallanthus canadensis, Euthamia caroliniana (= Euthamia tenuifolia), Oenothera humifusa*, and *Diodia teres*. The range of this community is not well known; North Carolina is likely the southern extent. This community is related to maritime grasslands of New England and New York. Further analysis is required to determine the classification, and thus the range, with confidence. Diagnostic species are *Morella pensylvanica, Schizachyrium littorale, Eupatorium hyssopifolium*, and *Eupatorium rotundifolium*.

Comments:

Range: This community ranges from New Jersey to Virginia and possibly North Carolina on coastal dunes.

Other States/Provinces: DE:S?, MD:S?, NC?, VA:S?

Physiographic Province, Section, Subsection: 232A:CP, 232B:CC, 232Ci:CCC

Synonymy: Shrub succession community, in part (Hill 1986) I, Xeric shrub community, in part (Higgins et al. 1971) I, Maritime Grassland (Higgins et al. 1971) I

References: Blizzard 1931, Dunwiddie and Harper 1993, Higgins et al. 1971, Hill 1986, Reschke 1990, Sneddon et al. 1996, The Nature Conservancy (TNC) 1995c

Authors: A. Berdine, ECS **Confidence:** 2 **Identifier:** CEGL004240

V.A.7.N.p. Saturated temperate or subpolar grassland with a sparse cold-deciduous shrub layer

V.A.7.N.p.300. CALAMOVILFA BREVIPILIS SATURATED SHRUB HERBACEOUS ALLIANCE

Pinebarren Sandreed Saturated Shrub Herbaceous Alliance

Concept: Saturated wetland of the New Jersey pine barrens. *Calamovilfa brevipilis* dominates this vegetation; scattered shrubs are most commonly *Gaylussacia dumosa*, but other associated shrubs include *Gaylussacia baccata, Lyonia mariana, Kalmia angustifolia*.

Comments:

Range: This alliance is found in New Jersey.

Other States/Provinces: NJ

Physiographic Province, Section, Subsection: 232Ab:CCC, **232Ac:**CCP

Synonymy:

References:

Authors: ECS **Identifier:** A.3007

GAYLUSSACIA DUMOSA / CALAMOVILFA BREVIPILIS SHRUB HERBACEOUS VEGETATION

Dwarf Huckleberry / Pinebarren Sandreed Shrub Herbaceous Vegetation

[Pine Barrens Sandreed Savanna] **G1** 98-11-12

S1 01-08-16

State Estimated EO's: A

State Area: B—Patch size ranges 1–2 acres—>100–200 acres.

Concept: Saturated wetland of the New Jersey Pine Barrens. *Calamovilfa brevipilis* dominates the wetland. Other herbaceous associates include *Gentiana autumnalis, Symphyotrichum dumosum (= Aster dumosus), Solidago* spp., and others. Shrubs are widely scattered, the most characteristic being *Gaylussacia dumosa*. Other shrubs may include *Vaccinium corymbosum, Lyonia mariana, Chamaedaphne calyculata, Gaylussacia baccata, Gaylussacia frondosa*, and *Kalmia angustifolia*. *Sphagnum* mosses make up the bryophyte layer. This vegetation is maintained by frequent fire, and is currently maintained by active ordnance explosion and burning on a military range.
Comments:
Range:
Other States/Provinces:
Physiographic Province, Section, Subsection: 232Ab:CCC, **232Ac:**CCP
Synonymy:
References: Windisch 1995b
Authors: ECS **Confidence:** 2 **Identifier:** CEGL006397

V.A.7.N.p.4. CAREX (FLAVA, HYSTERICINA, INTERIOR, STERILIS) SATURATED SHRUB HERBACEOUS ALLIANCE

(Yellow Sedge, Porcupine Sedge, Inland Sedge, Sterile Sedge) Saturated Shrub Herbaceous Alliance

Concept:
Comments:
Range: This alliance is found in New Jersey, Pennsylvania, New York, Vermont, New Hampshire, Connecticut, Massachusetts, and Maine.
Other States/Provinces: CT MA ME NH NJ NY PA VT
Physiographic Province, Section, Subsection: 221A:C?, **221Ba:**CCC, 222I:CC, M212A:CC, M212B:CC, M212C:CC
Synonymy:
References:
Authors: ECS **Identifier:** A.1561

DASIPHORA FRUTICOSA SSP. FLORIBUNDA / RHYNCHOSPORA CAPILLACEA—SCLERIA VERTICILLATA SHRUB HERBACEOUS VEGETATION

Shrubby-cinquefoil / Limestone Beaksedge—Savanna Nutrush Shrub Herbaceous Vegetation
[Lakeshore Marl Fen] **G1** 99-03-22
S1 01-08-16

State Estimated EO's: A
State Area: A—Patches typically less than 3 acres.

Concept: This vegetation occurs on the seepage areas of marl shores on calcareous lakes in New Jersey and perhaps elsewhere. The lakeshore is characterized by a thick deposit of marl which is seasonally very dry to xeric. Areas where groundwater emerges supports *Dasiphora fruticosa ssp. floribunda (= Pentaphylloides floribunda), Rhynchospora capillacea, Scleria verticillata, Panicum flexile, Equisetum variegatum, Utricularia minor, Cladium mariscoides*. Additional shrubs of sparse distribution include *Rhamnus alnifolia, Salix* spp., and possibly *Betula pumila*.
Comments:
Range:
Other States/Provinces: NY?
Physiographic Province, Section, Subsection: 221Ba:CCC

Synonymy:
References:
Authors: ECS **Confidence:** 2 **Identifier:** CEGL006356

JUNIPERUS VIRGINIANA / BETULA PUMILA / CAREX STERILIS—OLIGONEURON RIGIDUM SHRUB HERBACEOUS VEGETATION
Eastern Red-cedar / Bog Birch / Sterile Sedge—Bold Goldenrod Shrub Herbaceous Vegetation

G1Q 98-01-22
S1 01-08-16

State Estimated EO's: A
State Area: A—One occurrence less than 5 acres.

Concept: This vegetation, known locally as 'prairie fen' is restricted to one known occurrence in New Jersey, with a potential for up to four additional sites. It overlies calcareous bedrock and is characterized by a matrix of shrub thickets dominated by *Betula pumila* and *Dasiphora fruticosa ssp. floribunda (= Pentaphylloides floribunda)* interspersed among open graminoid areas characterized by *Carex sterilis, Carex flava, Carex buxbaumii, Carex leptalea*, and other cespitose sedges. Other typical fen herbs such as *Cypripedium reginae, Geum rivale, Parnassia glauca, Solidago patula, Solidago uliginosa, Sarracenia purpurea, Lobelia kalmii* and *Muhlenbergia glomerata* are found here. In addition, species such as *Symphyotrichum laeve (= Aster laevis), Sorghastrum nutans, Andropogon gerardii, Porteranthus trifoliatus*, and *Smilax tamnoides (= Smilax hispida)* that are more typical of upland habitats are also characteristic. *Juniperus virginiana*, also a typically upland species, occurs as large, mature, spreading individuals widely scattered in the herbaceous openings. The rare *Cypripedium candidum X andrewsii* of midwestern distribution is found in this vegetation. Hydrologically, this vegetation is unusual in that is very wet in spring and fall but droughty during the summer.
Comments:
Range:
Other States/Provinces:
Physiographic Province, Section, Subsection: 221Ba:CCC
Synonymy:
References:
Authors: ECS **Confidence:** 2 **Identifier:** CEGL006367

JUNIPERUS VIRGINIANA / DASIPHORA FRUTICOSA SSP. FLORIBUNDA / CAREX FLAVA—CAREX TETANICA SHRUB HERBACEOUS VEGETATION
Eastern Red-cedar / Shrubby-cinquefoil / Yellow Sedge—Rigid Sedge Shrub Herbaceous Vegetation
[Pasture Fen]

G1G2 98-01-23
S1S2 01-08-16

State Estimated EO's: B—Estimate 10–20 occurrences.
State Area: A—Less than 50 acres in state. Patch sizes range .25–10 acres.

Concept: This association is a saturated wetland of turfy mineral soil occurring over calcareous bedrock, a fen supporting a number of calciphytic species. It occurs in New Jersey and possibly Pennsylvania. *Juniperus virginiana* occurs as scattered individuals over an herbaceous understory characterized by *Carex flava, Carex tetanica, Juncus brachycephalus, Juncus dudleyi, Juncus nodosus, Equisetum fluviatile, Bromus kalmii, Castilleja coccinea, Sisyrinchium angustifolium, Solidago uliginosa, Eupatorium maculatum, Cypripedium parviflorum, Thelypteris palustris, Lobelia kalmii, Liatris spicata, Spiranthes*

lucida, Trollius laxus, Rudbeckia fulgida, Pedicularis canadensis, Pedicularis lanceolata, which is intermixed with the dwarf-shrubs *Betula pumila* and *Dasiphora fruticosa ssp. floribunda (= Pentaphylloides floribunda)*. This vegetation has been generally affected by grazing in the past, which in some cases continues to the present, and as such this vegetation is known locally as a 'pasture fen.'

Comments:
Range:
Other States/Provinces: PA:S?
Physiographic Province, Section, Subsection: 221Ba:CCC
Synonymy:
References:
Authors: ECS **Confidence:** 2 **Identifier:** CEGL006357

MORELLA PENSYLVANICA—DASIPHORA FRUTICOSA SSP. FLORIBUNDA / CAREX STERILIS—CAREX FLAVA SHRUB HERBACEOUS VEGETATION
Northern Bayberry—Shrubby-cinquefoil / Sterile Sedge—Yellow Sedge Shrub Herbaceous Vegetation
[Northern Piedmont Rich Fen] **G2** 98-01-12
S2 01-08-16

State Estimated EO's: BC—15–40 occurrences estimated.
State Area: U—90–120 acres estimated. Patch size 1/4–10 acres.

Concept: This calcareous 'fen' association is characterized by herbaceous vegetation maintained by groundwater springs. Peat accumulation is minimal, with mineral soil or marl often evident at the surface, particularly where ground-water emerges. Although the shrubs are generally of sparse cover (less than 25%), they are characteristic of this vegetation, *Dasiphora fruticosa ssp. floribunda (= Pentaphylloides floribunda)* occurring in all associations of this alliance, and *Morella pensylvanica (= Myrica pensylvanica)* differentiating this association from others of the alliance. *Toxicodendron vernix, Acer rubrum*, and *Juniperus virginiana* are frequent associates. The herbaceous flora is rich and diverse, and includes the sedges *Carex sterilis, Carex flava, Carex cryptolepis, Rhynchospora capillacea, Rhynchospora alba*, as well as *Parnassia glauca, Drosera rotundifolia, Sarracenia purpurea, Lobelia kalmii, Panicum flexile, Juncus brachycephalus, Juncus nodosus*, and *Spiranthes cernua*. This association is restricted to New Jersey, Pennsylvania, and perhaps Ohio.

Comments:
Range: This association is limited to New Jersey and Pennsylvania and possibly southwestern New York.
Other States/Provinces: NY?, PA:S?
Physiographic Province, Section, Subsection: 221B:CC
Synonymy:
References:
Authors: ECS **Confidence:** 1 **Identifier:** CEGL006103

V.A.7.N.p.6. MYRICA GALE / CAREX LASIOCARPA SATURATED SHRUB HERBACEOUS ALLIANCE

Sweet Gale / Wiregrass Sedge Saturated Shrub Herbaceous Alliance

Concept:
Comments:
Range: This alliance is found in New Hampshire, Vermont, Connecticut, New York, Maine, Pennsylvania, Rhode Island, New Jersey, and Massachusetts.
Other States/Provinces: CT MA ME NH NJ NY PA RI VT
Physiographic Province, Section, Subsection: 212A:CC, 212B:CC, 212C:C?, 212D:C?, 221A:CC, **221B:**CC, M212A:CC, M212B:CC, M212C:CC, M212D:CC
Synonymy:
References:
Authors: ECS **Identifier:** A.1563

MYRICA GALE—DASIPHORA FRUTICOSA SSP. FLORIBUNDA / CAREX LASIOCARPA—CLADIUM MARISCOIDES SHRUB HERBACEOUS VEGETATION

Sweet Gale—Shrubby-cinquefoil / Wiregrass Sedge—Twig-rush Shrub Herbaceous Vegetation

G2G3 98-01-12
S1 01-08-16

State Estimated EO's: A—2–5 occurrences estimated.
State Area: A—Less than 30 acres in state. Patch size ranges from 1/4–5 acres.

Concept: This association is a calcareous fen overlying deep peat accumulations of lakes and other depressions of the Lower New England / Northern Piedmont Ecoregion. It is characterized by rhizomatous sedges that form a mat, with variable shrub cover. Typical sedges include *Carex lasiocarpa, Carex prairea, Carex leptalea, Carex stricta (= var. strictior), Carex buxbaumii, Carex flava, Carex cryptolepis, Carex lacustris, Carex livida, Cladium mariscoides*. Shrubs are generally confined to hummocks, but cover varies among occurrences and can exceed 25%. Characteristic species include *Myrica gale, Dasiphora fruticosa ssp. floribunda (= Pentaphylloides floribunda), Betula pumila, Salix candida, Rhamnus alnifolia, Alnus* spp., *Cornus sericea*. *Larix laricina* may occur as scattered individuals atop hummocks. Hollows and channels often support *Utricularia intermedia, Utricularia gibba, Menyanthes trifoliata, Lobelia kalmii*. Other herbs include *Symphyotrichum boreale (= Aster borealis)* and *Sarracenia purpurea*. In New Jersey, this association is referred to as 'deep peat fen.' MCS: This rich graminoid fen community is strongly minerotrophic, occurring in areas with highly calcareous springs or seeps. The substrate is predominately a graminoid peat which may or may not be underlain by marl. The groundwater is rich in minerals and has pH values ranging from 6.0-7.8. Graminoids dominate the community. Characteristic species include *Carex aquatilis, Carex flava, Carex hystericina, Carex lasiocarpa, Carex prairea, Cladium mariscoides, Eleocharis rostellata, Muhlenbergia glomerata, Rhynchospora alba, Schoenoplectus acutus (= Scirpus acutus)*, and *Typha latifolia*. Forbs and ferns include *Doellingeria umbellata (= Aster umbellatus), Drosera rotundifolia, Iris versicolor, Osmunda regalis, Parnassia glauca, Pogonia ophioglossoides, Sarracenia purpurea*, and *Thelypteris palustris*. Characteristic mosses include *Campylium stellatum, Drepanocladus revolvens, Scorpidium scorpioides*, and *Tomentypnum nitens*. *Sphagnum* spp. may be absent or are minor components. Species include the more minerotrophic *Sphagnum contortum, Sphagnum warnstorfii* and *Sphagnum teres*. Shrubs may be present, but they contribute less than 50% cover. Characteristic shrubs include *Cornus foemina, Cornus sericea, Morella pensylvanica (= Myrica pensylvanica), Dasiphora fruticosa ssp. floribunda, Rhamnus alnifolia* and *Salix candida*.

Comments: Although species such as *Morella pensylvanica (= Myrica pensylvanica)* and *Juniperus virginiana* are restricted to occurrences in New Jersey and Pennsylvania, the overall composition of this type does not warrant further division.
Range:
Other States/Provinces: CT:S?, MA:S?, ME:S?, NH:S?, NY:S?, PA:S?, RI:S?, VT:S?
Physiographic Province, Section, Subsection: 221A:CC, **221B:**CC, M212B:CC, M212C:CC
Synonymy:
References:
Authors: ECS **Confidence:** 1 **Identifier:** CEGL006068

V.B.2.N.e. Semipermanently flooded temperate perennial forb vegetation

V.B.2.N.e.1. PONTEDERIA CORDATA—PELTANDRA VIRGINICA SEMIPERMANENTLY FLOODED HERBACEOUS ALLIANCE

Pickerelweed—Green Arrow-arum Semipermanently Flooded Herbaceous Alliance

Concept: This alliance includes very wet or partially submerged forb vegetation of rivershores and lakeshores, and sometimes of artificial ponds, lakes, and impoundments. In addition to the nominal species, typical associates include *Nuphar lutea, Glyceria striata, Schoenoplectus tabernaemontani (= Scirpus validus), Schoenoplectus americanus (= Scirpus americanus)*, and *Sagittaria latifolia*.
Comments: ECS concept includes vegetation of the low zone of freshwater tidal marshes within this alliance.
Range: This alliance is found in Arkansas, Kentucky, North Carolina, South Carolina, Tennessee, Connecticut, Delaware, Massachusetts, Maryland, Maine, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, Virginia, and West Virginia.
Other States/Provinces: AR CT DE? KY MA MD? ME NC NH NJ? NY ON PA RI SC TN VA VT WV
Physiographic Province, Section, Subsection: 212Aa:C??, 212Ab:C??, 212Ba:C??, 212Bb:C??, 212Ca:C??, 212Cb:C??, 212Da:C??, 212Db:C??, 212Dc:C??, 212Ea:C??, 212Eb:C??, 212Ec:C??, 212Ed:C??, 212Fa:C??, 212Fb:C??, 212Fc:C??, 212Ga:CPP, 212Gb:CP?, 221Aa:C??, 221Ab:C??, 221Ac:C??, 221Ad:C??, **221Ae:**C??, 221Af:C??, 221Ag:C??, 221Ah:C??, 221Ai:C??, 221Aj:C??, 221Ak:C??, 221Al:C??, **221Ba:**C??, 221Bb:C??, 221Bc:C??, 221Db:C??, 221Fa:C??, 221Ja:C??, 221Jc:C??, 222Ch:CCC, 222Db:CCC, 222Eb:CCC, 222Ia:C??, 222Ib:C??, 222Ic:C??, 222Id:C??, 222Ie:C??, 222If:C??, 231Aa:C??, 231Ae:C??, 231Af:C??, 231Ak:C??, 231Al:C??, 231Am:C??, 231An:C??, 231Ao:C??, 231Ap:C??, 232Aa:P??, **232Ac:**P??, 232Ad:P??, 232Bb:P??, 232Bc:P??, 232Bd:P??, 232Br:P??, 232Ch:P??, 234An:CCC, M212Aa:C??, M212Ab:C??, M212Ac:C??, M212Ad:C??, M212Ba:C??, M212Bb:C??, M212Ca:C??, M212Cc:C??, M212Cd:C??, M212Da:C??, M212Db:C??, M212Dc:C??, M212Ea:C??, M212Eb:C??, M212Fa:C??, M212Fb:C??, M221Aa:CC?, M221Ab:CC?, M221Ac:CCC, M221Ad:CCC, M221Ba:C??, M221Bd:C??, M221Da:CC?, M221Db:CC?, M221Dc:CCC
Synonymy: Piedmont/Mountain Semipermanent Impoundment, in part (Schafale and Weakley 1990)
References: Schafale and Weakley 1990, Sneddon et al. 1996
Authors: ECS, MP, ECS **Identifier:** A.1669

Peltandra virginica—Saururus cernuus—Carex crinita / Climacium americanum Herbaceous Vegetation
Green Arrow-arum—Lizard's-tail—Fringed Sedge / Tree Moss Herbaceous Vegetation
[Floodplain Pool] **G2?** 98-12-14
S? 01-08-16

State Estimated EO's: ?—Not yet ranked in New Jersey.
State Area:

Concept: This vegetation occupies depressions of Piedmont and mountain floodplains. Vegetative cover is generally low and may be confined to edges or shallower portions that dry out during the growing season. The vascular plant species vary widely among examples. Emergent vegetation may include *Peltandra virginica, Dulichium arundinaceum*, and *Polygonum* spp. *Carex crinita* or some other wetland *Carex* species are almost always present, and *Climacium americanum* is often abundant on the landward side. Larger examples may have pad-leaved aquatic species such as *Brasenia schreberi* or *Nymphaea odorata*. Piedmont examples may also have *Saururus cernuus* and *Boehmeria cylindrica*. Some examples have wetland shrubs on edges or in shallow portions, including *Cornus amomum* and *Cephalanthus occidentalis*. These depressions are usually abandoned channel segments or swales behind natural levees in which water is ponded for all or much of the year. Water may be supplied primarily by stream flooding or by rainfall.
Comments: These floodplain pools are transitional between wetland vegetated communities and aquatic communities. They are more distinctive for their aquatic fauna (and probably microflora) than for their higher plant communities. Two distinct kinds can be recognized based on the aquatic animal communities: Pools that are flooded by overbank stream flow at least as often as they dry out support fish as the dominant animal component. Those that are flooded more rarely and dry out between floods lack fish most of the time and support significant amphibian communities. These differences are not known to be reflected in vegetation, but are important ecologically.
Range:
Other States/Provinces: DE?, MD?, NC:S?, NJ?, TN?, VA:S?
Physiographic Province, Section, Subsection: 221:?, 231:P, M221Dc:CCC
Synonymy:
References: Schafale and Weakley 1990
Authors: SCS **Confidence:** 2 **Identifier:** CEGL007696

V.B.2.N.g. Tidal temperate perennial forb vegetation

V.B.2.N.g.6. AMARANTHUS CANNABINUS TIDAL HERBACEOUS ALLIANCE
Water-hemp Tidal Herbaceous Alliance

Concept: This alliance occupies a mid-tidal position on sandy intertidal rivershores of meso-oligohaline waters. It is dominated by *Amaranthus cannabinus*, which can be mixed with *Zizania aquatica, Schoenoplectus pungens (= Scirpus pungens), Bidens* spp., and numerous small rosette plants. More data are needed to fully characterize this alliance.
Comments:
Range: This alliance is found in Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, and Virginia.
Other States/Provinces: CT DE MA MD ME NH NJ NY RI VA?
Physiographic Province, Section, Subsection: 212Cb:PPP, 212Db:PPP, 212Dc:PPP, 221Aa:CCP, 221Ab:CCP, 221Ac:CCP, 221Ad:CCP, **221Ae:**CCP, 221Aj:CCP, 221Ak:CCP, **221Ba:**CC?, **221Da:**C??, **221Dc:**C??, 232Aa:CCP, **232Ac:**CCC, 232Bz:CP?, 232Ch:CCP, 232Ci:CCP, M212Eb:PPP

Synonymy:
References: Sneddon et al. 1996
Authors: JT, ECS **Identifier:** A.1706

AMARANTHUS CANNABINUS TIDAL HERBACEOUS VEGETATION
Water-hemp Tidal Herbaceous Vegetation

G3G5
S2S3 01-08-16

State Estimated EO's: C
State Area: B—Patch size 1–10 acres.

Concept: This vegetation occupies a mid-tidal position on sandy intertidal rivershores of meso-oligohaline waters. It is dominated by *Amaranthus cannabinus*, which can be mixed with *Zizania aquatica, Schoenoplectus pungens (= Scirpus pungens), Bidens* spp., and numerous small rosette plants.
Comments:
Range:
Other States/Provinces: CT:S?, DE:S?, MA:S?, MD:S?, ME:S?, NH:S?, NY:S?, RI:S?, VA?
Physiographic Province, Section, Subsection: 221A:CC, **221B:**CC, **232Ac:**CCC, 232C:CP
Synonymy:
References:
Authors: ECS **Confidence:** 2 **Identifier:** CEGL006080

V.B.2.N.g.1. ERIOCAULON PARKERI TIDAL HERBACEOUS ALLIANCE
Estuary Pipewort Tidal Herbaceous Alliance

Concept: This alliance is freshwater tidal vegetation occurring on sandy or gravelly shores that are exposed only at low tide. This vegetation type is restricted to areas that receive substantial scour during spring floods, since *Eriocaulon parkeri* is very susceptible to siltation. Associated species may include *Sagittaria subulata, Isoetes riparia, Elatine minima*, and *Sagittaria calycina*.
Comments:
Range: This alliance is found in North Carolina, Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, and Virginia, and in Canada, and possibly in South Carolina (?).
Other States/Provinces: CT DE MA MD ME NC NJ NY SC? VA
Physiographic Province, Section, Subsection: 212Db:PPP, 221Aa:CC?, **221Ae:**CC?, 221Ag:CCP, 221Ak:CCP, **221Ba:**CC?, 232Aa:CCP, **232Ac:**CCP, 232Br:CPP, 232Cb:CCC, 232Ci:CCC
Synonymy:
References:
Authors: A.S. WEAKLEY AFTER VAHP, JT, ECS **Identifier:** A.1701

ERIOCAULON PARKERI—POLYGONUM PUNCTATUM HERBACEOUS VEGETATION
Estuary Pipewort—Dotted Smartweed Herbaceous Vegetation
[Estuary Pipewort Brackish Intertidal Flat]

G2 98-11-09
S2? 01-08-16

State Estimated EO's: C
State Area: B—Patch sizes <1–5 acres.

Concept: This freshwater tidal community occurs in estuaries of the northeastern U.S., generally confined to low marsh where it is subjected to high levels of flood disturbance. As a result, the substrate is generally sandy or gravelly with a low proportion of organic

material. The vegetation is low, generally less than 35 cm in height, with variable cover of scattered to fairly dense *Eriocaulon parkeri*. Associates include *Polygonum punctatum, Isoetes riparia, Lindernia dubia, Bidens eatonii*, and *Ludwigia palustris*.

Comments:
Range:
Other States/Provinces: CT:S?, DE:S?, MA:S?, MD:S?, ME:S?, NC:S?, NY:S?, SC?, VA:S?
Physiographic Province, Section, Subsection: 221A:CC
Synonymy:
References: Barrett 1994
Authors: ECS **Confidence:** 2 **Identifier:** CEGL006352

V.B.2.N.g.8. NUPHAR LUTEA TIDAL HERBACEOUS ALLIANCE
Yellow Pondlily Tidal Herbaceous Alliance

Concept: Tidal mudflats dominated by *Nuphar lutea*. This alliance includes vegetation of freshwater tidal rivers where the water depth is approximately 2-3 m or less. *Nuphar lutea* and *Nymphaea odorata* are dominant; these species quickly spread from their rhizomes and shade out other vegetation. Other species may include *Potamogeton epihydrus, Peltandra virginica, Nymphoides cordata*, and *Zizania aquatica*. In Delaware, this alliance occurs in nearly pure stands below mean low water on mudflats that are exposed at low tide and on the submerged point bars of stream meanders.

Comments:
Range: This alliance is found in North Carolina, Connecticut, Delaware, the District of Columbia, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Virginia.
Other States/Provinces: CT DC DE MA MD ME NC NH NJ NY PA RI VA
Physiographic Province, Section, Subsection: 221A:CC, **232Ac:**CCC, 232Bz:CCC, 232Ch:CCC, 232Ci:CCC
Synonymy: Spatterdock: 31 (McCormick and Somes 1982); Spatterdock Community Type (Odum et al. 1984); V.C.2.a.2. *Nuphar lutea* Herbaceous Alliance. in part? (Sneddon et al. 1996)
References: McCormick and Somes 1982, Odum et al. 1984, Sneddon et al. 1996
Authors: ECS/SCS, JT, ECS **Identifier:** A.1708

NUPHAR LUTEA SSP. ADVENA TIDAL HERBACEOUS VEGETATION
Broadleaf Pondlily Tidal Herbaceous Vegetation

G?
S2S3 01-08-16

State Estimated EO's: BC
State Area: U

Concept: Tidal mud flats dominated by *Nuphar lutea ssp. advena*. This alliance includes vegetation of freshwater tidal rivers where the water depth is approximately 2-3 m or less. *Nuphar lutea ssp. advena* and *Nymphaea odorata* are dominant; these species quickly spread from their rhizomes and shade out other vegetation. Other species may include *Potamogeton epihydrus, Peltandra virginica, Nymphoides cordata*, and *Zizania aquatica*. In Delaware, this alliance occurs in nearly pure stands below mean low water on mud flats that are exposed at low tide and on the submerged point bars of stream meanders.

Comments:
Range:
Other States/Provinces: CT:S?, DC:S?, DE:S?, MA:S?, MD:S?, ME:S?, NC:S?, NH:S?, NY:S?, PA:S?, RI:S?, VA:S?
Physiographic Province, Section, Subsection: 221:C, **232Ac:**CCC, 232B:CC, 232C:CC

Synonymy:
References:
Authors: ECS **Confidence:** 2 **Identifier:** CEGL004472

V.B.2.N.g.3. PELTANDRA VIRGINICA—PONTEDERIA CORDATA TIDAL HERBACEOUS ALLIANCE

Green Arrow-arum—Pickerelweed Tidal Herbaceous Alliance

Concept: Freshwater tidal marshes dominated by variable mixtures of *Peltandra virginica* and *Pontederia cordata*. Other species present can include *Bidens* spp., *Zizania aquatica, Sagittaria* spp., *Acorus americanus*, and *Polygonum* spp. This alliance occurs primarily in low portions of the intertidal zone, on mucky substrates.
Comments:
Range: This alliance is found in Connecticut, Delaware, Massachusetts, Maryland, Maine, New Hampshire, New Jersey, New York, Rhode Island, and Virginia, and possibly Pennsylvania (?).
Other States/Provinces: CT DE MA MD ME NH NJ NY PA? RI VA
Physiographic Province, Section, Subsection: 221A:CC, **221B:**CC, **221D:**CP, **232Ab:**CCP, **232Ac:**CCC, 232Ad:CCP, 232Bx:CCP, 232Ch:CCP
Synonymy: Pickerelweed/Arrowarum: 32 (McCormick and Somes 1982); Arrow-arum/Pickerelweed Community Type (Odum et al. 1984)
References: McCormick and Somes 1982, Odum et al. 1984
Authors: A.S. WEAKLEY AFTER ODUM E, JT, SCS **Identifier:** A.1703

Mixed Forbs High Marsh Tidal Herbaceous Vegetation [Placeholder]

Mixed Forbs High Marsh Tidal Herbaceous Vegetation
[Freshwater Tidal Marsh]

G?
S3 01-08-16

State Estimated EO's: C
State Area: C—1300 total acres; <10–120 acres in size; many are +/- 50 acres (most of largest are 50 acres)

Concept: This is a placeholder for community association(s) to be developed in this alliance.
Comments:
Range:
Other States/Provinces: CT:S?, DE:S?, MA:S?, MD:S?, ME:S?, NH:S?, NY:S?, PA?, RI:S?, VA:S?
Physiographic Province, Section, Subsection: 221A:CC, **221B:**CC, **221D:**CP, **232Ac:**CCC, 232B:CP, 232C:CP
Synonymy:
References:
Authors: ECS **Confidence:** 3 **Identifier:** CEGL006325

Peltandra virginica—Pontederia cordata Tidal Herbaceous Vegetation

Green Arrow-arum—Pickerelweed Tidal Herbaceous Vegetation

G3G4 98-11-04
S? 01-08-16

State Estimated EO's: ?—Not yet ranked in New Jersey.
State Area:

Concept: Freshwater tidal marshes dominated by variable mixtures of *Peltandra virginica* and *Pontederia cordata*. Other species present can include *Bidens* spp., *Zizania aquatica, Sagittaria* spp., *Acorus americanus*, and *Polygonum* spp. This community occurs primarily in low portions of the intertidal zone, on mucky substrates.

Comments:
Range: Occurs from Maine to Virginia, excluding Rhode Island and New Hampshire.
Other States/Provinces: CT:S?, DE:S4, MA:S?, MD:S?, ME:S?, NY:S?, VA:S?
Physiographic Province, Section, Subsection: 232Ab:CCP, **232Ac:**CCP, 232Ad:CCP, 232Bx:CCP, 232Ch:CCP
Synonymy: Arrow-arum/Pickerelweed Community Type (Odum et al. 1984)
References: Odum et al. 1984
Authors: ECS **Confidence:** 2 **Identifier:** CEGL004706

V.B.2.N.g.10. SAGITTARIA SUBULATA—LIMOSELLA AUSTRALIS TIDAL HERBACEOUS ALLIANCE

Awl-leaf Arrowhead—Awlwort Tidal Herbaceous Alliance

Concept: Low intertidal marshes, characterized by sparse to more dense vegetation of *Sagittaria subulata* and *Limosella australis*.
Comments:
Range: This alliance is found in North Carolina, Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island (?), and Virginia, and in Canada.
Other States/Provinces: CT DE MA MD ME NC NH NJ NY RI? VA
Physiographic Province, Section, Subsection: 221A:CC, **232Ab:**CCP, **232Ac:**CCP, 232Ad:CCP, 232Bx:CCC, 232Bz:CCP, 232Ch:CCC
Synonymy:
References:
Authors: ECS/SCS, JT, ECS **Identifier:** A.1710

Sagittaria subulata—Limosella australis Tidal Herbaceous Vegetation
Awl-leaf Arrowhead—Awlwort Tidal Herbaceous Vegetation

G?
S1S3 01-08-16

State Estimated EO's: AC
State Area: U

Concept: This tidal flat community occurs on the northeastern Atlantic coast on muddy to sandy substrates of broad, flat tidal river shores. The flats are exposed at low tide and submerged at high tide. Vegetation is of variable cover and may be quite sparse. Characteristic plants are low-growing rosette species such as *Sagittaria subulata, Sagittaria calycina var. spongiosa (= Sagittaria spathulata), Limosella australis (= Limosella subulata), Lilaeopsis chinensis, Zannichellia palustris*, and *Eleocharis parvula*.
Comments:
Range:
Other States/Provinces: CT:S?, DE:S?, MA:S?, MD:S?, ME:S?, NC:S?, NH:S?, NY:S?, RI?, VA:S?
Physiographic Province, Section, Subsection: 221A:CC, **232A:**CC, 232B:CC, 232C:CC
Synonymy:
References:
Authors: ECS **Confidence:** 2 **Identifier:** CEGL004473

V.C.2.N.a. Permanently flooded temperate or subpolar hydromorphic rooted vegetation

V.C.2.N.a.102. NYMPHAEA ODORATA—NUPHAR SPP. PERMANENTLY FLOODED TEMPERATE HERBACEOUS ALLIANCE

White Waterlily—Yellow Pondlily species Permanently Flooded Temperate Herbaceous Alliance

Concept: This alliance, common throughout most of the eastern and central United States and adjacent Canadian provinces, contains vegetation which may occur in a variety of slow-moving water bodies, including rivers, millponds, blackwater rivers, streams, shallow ponds or lakes, or on shores of deeper water bodies including freshwater tidal areas. The water depth is generally greater than 0.5 m and up to 2 m. Stands are dominated by hydromorphic rooted aquatic plants, typically *Nuphar lutea* (any of its various subspecies), with or without *Nymphaea odorata*. Emergent vegetation is less than 25%, and typically plant species diversity is low. Other species present may include *Utricularia* spp., *Potamogeton* spp., and others. In the north, *Brasenia schreberi* may be locally dominant. Other characteristic northern species include *Nymphaea tetragona* and *Potamogeton amplifolius*. Associates found in the Midwest include *Polygonum amphibium*. In the Southeast, examples may include the floating or emergent 'pad-leaved' species *Nelumbo lutea* or *Nymphoides aquatica*. Submerged aquatic species which may be present include *Cabomba caroliniana, Ceratophyllum demersum*, and *Heteranthera dubia*. Stands of this alliance are permanently to semipermanently flooded.

Comments: Field guidelines for separating floating-leaved aquatic alliances from submerged aquatic alliances are also needed.

Range: This alliance is common throughout most of the eastern and central United States and adjacent Canadian provinces. It is also found in Oregon, Washington, California, Idaho, Colorado, and possibly Wyoming (?).

Other States/Provinces: AL AR CA CO CT DE FL GA IA ID IL IN KY LA MA MB MD ME MI MN MO MS NC NH NJ NY OH OK ON OR PA RI SC TN TX VA VT WA WI WV WY?

Physiographic Province, Section, Subsection: 212Cb:CCC, 212Ha:CPP, 212Hb:CPP, 212He:CPP, 212Hh:CPP, 212Hi:CPP, 212Hj:CPP, 212Hk:CPP, 212Hl:CPP, 212Hm:CPP, 212Hn:CPP, 212Ho:CPP, 212Hp:CPP, 212Hq:CPP, 212Hr:CPP, 212Hs:CPP, 212Ht:CPP, 212Hu:CPP, 212Hv:CPP, 212Hw:CPP, 212Hx:CPP, 212Hy:CPP, 212Ib:CPP, 212Ja:CCP, 212Jb:CCP, 212Jc:CCP, 212Je:CCP, 212Jf:CCP, 212Jj:CCP, 212Jk:CCP, 212Jl:CCP, 212Jm:CCC, 212Jn:CCP, 212Jo:CCP, 212Jr:CCP, 212Ka:CPP, 212La:CCP, 212Lb:CCC, 212Lc:CCP, 212Ld:CCC, 212Ma:CPP, 212Mb:CPP, 212Na:CPP, 212Nb:CPP, 212Nc:CPP, 221A:CC, **221B:**CC, 221Ea:CCC, 221Ed:CC?, 221Ef:CCC, 221He:CCC, 222Ch:CCC, 222Db:CCC, 222Gc:C??, 222Ha:CCC, 222Ja:CCC, 222Jb:CCC, 222Je:CCC, 222Ji:CCC, 222Jj:CCC, 222Kf:CCC, 222Kg:CCC, 222Kh:CCC, 222Kj:CCC, 231Ga:CCC, 231Gb:CCC, 231Gc:CCC, **232Ac:**CCC, 232Bg:CCC, 232Bj:CC?, 232Ca:CCC, 232Cb:CCC, 232Cc:CC?, 232Cd:CCC, 232Ch:CCC, 232Dc:CCC, 234Ac:CC?, 234An:CCC, 251Cf:CCC, 251Dd:CCC, 251Dg:CCC, 251Eb:CCC, M212:C, M221Aa:CCC, M221Ab:CCC, M221Ac:CCC, M221Ad:CCC, M221Ba:CCC, M221Bb:CCC, M221Bc:CCC, M221Bd:CCC, M221Be:CCC, M221Bf:CCC, M221Da:CCC, M331A:CC, M331D:CC, M331H:CC, M332E:CC, M333A:CC, M333B:CC, M333D:CC

Synonymy: Spring-run Stream, in part (Florida Natural Areas Inventory 1990); Open water/aquatic bed veg., natural impoundment pond (Ambrose 1990a); Small Depression Pond, in part (Schafale and Weakley 1990); *Nuphar lutea* herbaceous series (Hoagland 1997); L5D2aI1a. *Nuphar lutea* (Foti et al. 1994); *Nymphaea odorata* herbaceous series (Hoagland 1997); No equivalent (Nelson 1986)

References: Ambrose 1990a, Faber-Langendoen et al. 1996, Florida Natural Areas Inventory 1990, Foti et al. 1994, Harris et al. 1996, Heineke 1987, Hoagland 1997, Kovalchik 1993, Marr et al. 1980, Penfound 1952, Ramaley 1909, Sawyer and Keeler-Wolf 1995, Schafale and Weakley 1990, Wharton 1978, Wolfe 1990
Authors: M. PYNE, MOD M.S. REID, MP, SCS **Identifier:** A.1984

NUPHAR LUTEA SSP. ADVENA—NYMPHAEA ODORATA HERBACEOUS VEGETATION
Broadleaf Pondlily—White Waterlily Herbaceous Vegetation
[Water Lily Aquatic Wetland] **G4G5** 96-10-03
S4 01-08-16

State Estimated EO's: CD
State Area: C—Patches range 1/2–50 acres.

Concept: This rooted aquatic or open marsh community occupies shallow water depressions, oxbow ponds, backwater sloughs of river floodplains, slow moving streams, ponds, and small lakes throughout the central and eastern United States. It is dominated by rooted, floating-leaved aquatic species, with both submergent and emergent aquatics also present. *Nuphar lutea ssp. advena* and *Nymphaea odorata* are dominants. Other species present may include *Brasenia schreberi*, various *Potamogeton* spp., *Polygonum amphibium*, and *Polygonum amphibium var. emersum (= Polygonum coccineum)*. Submerged aquatics more common in the southern part of the range include *Cabomba caroliniana, Ceratophyllum demersum*, and *Heteranthera dubia*.
Comments: Occurs in borrow pits on Kisatchie National Forest. On the Conecuh National Forest (Alabama), vegetation of this alliance occurs in Gum Pond and Open Pond as a mix of *Nymphaea odorata* and *Nuphar lutea ssp. advena*.
Range: This rooted aquatic community occupies shallow, quiet waters throughout the central and eastern United States, extending from Maine to Ontario and Minnesota, south to Oklahoma and east to Georgia.
Other States/Provinces: AL:S?, AR:S?, CT:S?, DE:S?, GA:S?, IA:SU, IL:S?, IN:S?, KY:S?, LA:S?, MA:S?, MD:S?, ME:S?, MI:S?, MN:S?, MO:S?, MS:S?, NC:S?, NH:S?, NY:S?, OH:S?, OK:S?, ON:S?, PA:S?, RI:S?, SC:S?, TN:S?, TX:S?, VA:S?, VT:S?, WI:S?, WV:S?
Physiographic Province, Section, Subsection: 212Cb:CCC, 212Hb:CPP, 212Ja:CCP, 212Jb:CCP, 212Jc:CCP, 212Je:CCP, 212Jf:CCP, 212Jj:CCP, 212Jl:CCP, 212Jm:CCC, 212Ka:CPP, 221Ea:CCC, 221Ed:CC?, 221Ef:CCC, 221He:CCC, 222Ch:CCC, 222Db:CCC, 222Gc:C??, 222Ha:CCC, 222Ja:CCC, 222Jb:CCC, 222Ji:CCC, 222Jj:CCC, 222Kf:CCC, 222Kg:CCC, 222Kh:CCC, 222Kj:CCC, 231Bc:CCC, 231Ga:CCC, 231Gb:CCC, 231Gc:CCC, 234Ac:CC?, 234An:CCC, 251Cf:CCC, 251Dd:CCC, 251Dg:CCC, 251Eb:CCC, M221Aa:CCC, M221Ab:CCC, M221Ac:CCC, M221Ad:CCC, M221Ba:CCC, M221Bb:CCC, M221Bc:CCC, M221Bd:CCC, M221Be:CCC, M221Bf:CCC, M221Da:CCC
Synonymy: L5D2aI1a. *Nuphar lutea* (Foti et al. 1994), Cowlily Aquatic Bed (Foti et al. 1994), Open water marsh with floating-leaved plants (NAP) (Foti et al. 1994)
References: ABI Ecology—Southeast U.S. unpubl. data, Ambrose 1990a, Anderson 1982, Florida Natural Areas Inventory 1990, Foti et al. 1994, Hoagland 1997, Schafale and Weakley 1990
Authors: D. Faber-Langendoen, MCS **Confidence:** 3 **Identifier:** CEGL002386

NYMPHAEA ODORATA—ELEOCHARIS ROBBINSII HERBACEOUS VEGETATION
White Waterlily—Robbins Spikerush Herbaceous Vegetation
[Coastal Plain Pond] **G2** 98-12-07
S1S2 01-08-16

State Estimated EO's: C
State Area: A—Patch size ranges 1/4–1 acre.

Concept: This hydromorphic Coastal Plain pond community ranges from southern New England to Maryland. It occurs in standing water in all but exceptionally dry years. The substrate is most often deep muck, but in oligotrophic ponds an organic layer may be absent or much reduced and the vegetation occurs on sand or mucky sand. Characteristic species include *Nymphaea odorata, Nymphoides cordata*, and *Eleocharis robbinsii*, with frequent associates including *Scleria reticularis, Gratiola aurea, Proserpinaca pectinata, Utricularia juncea, Brasenia schreberi, Pontederia cordata, Ludwigia* spp., *Utricularia* spp., and *Eriocaulon aquaticum*.
Comments:
Range: This association is limited to the Atlantic and Coastal plains from southern New England to Maryland.
Other States/Provinces: DE:S?, MA:S?, MD:S?, NH:S?, NY:S?, RI:S?
Physiographic Province, Section, Subsection: 221A:CC, **221B:**CC, **232Ac:**CCC, 232C:CP
Synonymy:
References: Sneddon 1994
Authors: ECS **Confidence:** 1 **Identifier:** CEGL006086

V.C.2.N.a.12. PODOSTEMUM CERATOPHYLLUM PERMANENTLY FLOODED HERBACEOUS ALLIANCE

Riverweed Permanently Flooded Herbaceous Alliance

Concept: Vegetation of shoals in rocky streambeds and riverbeds in mature drainage systems where the streams have cut down to rock, and the floodplain is relatively narrow; or on dams in moderately fast- to fast-flowing water. The vegetation grows attached to rocks in outcrops and stream rubble, or to dams in moderate- to fast-flowing water. This almost always is a monospecific community dominated by *Podostemum ceratophyllum* with no other vascular plants present; some Rhodophyta (red algae) may be present.
Comments: Vegetation of this alliance has been documented from the Sepulga River in the East Gulf Coastal Plain of Alabama. In the Interior Low Plateau of Tennessee, this vegetation is known from the upper Duck River at Manchester (Old Stone Fort State Park).
Range: This alliance is found in Alabama, Arkansas, Georgia, Kentucky, North Carolina, Oklahoma, South Carolina, Tennessee, Connecticut, Delaware, Massachusetts, Maryland, Maine, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, and Virginia.
Other States/Provinces: AL AR CT DE GA KY MA MD ME NC NH NJ NY OK PA RI SC TN VA VT
Physiographic Province, Section, Subsection: 221Ha:CCC, 221Hb:CCC, 221Hc:CCC, 221He:CCC, 222Eb:CCC, 222En:CCP, 222Eo:CCP, 231Af:CCC, 232Bj:CCC, M221Aa:CC?, M221Ab:CC?, M221Ac:CCC, M221Ad:CC?, M221Bb:C??, M221Bd:C??, M221Be:C??, M221Bf:C??, M221Da:CC?, M221Dc:CCC, M221Dd:CCC, M222Aa:CCC, M231Aa:CCC, M231Ab:CCC, M231Ac:CCC, M231Ad:CCC
Synonymy: Rocky Bar and Shore, in part (Schafale and Weakley 1990); *Podostemum ceratophyllum* herbaceous series (Hoagland 1997); Shoal and Stream Bar, in part (Nelson 1986)
References: DuMond 1970, Hoagland 1997, Nelson 1986, Schafale and Weakley 1990, Tobe et al. 1992
Authors: A.S. WEAKLEY, MP, SCS **Identifier:** A.1752

PODOSTEMUM CERATOPHYLLUM HERBACEOUS VEGETATION
Riverweed Herbaceous Vegetation
[Rocky Bar and Shore (Riverweed Type)] **G5** 97-11-22
S? 01-08-16

State Estimated EO's: ?—Not yet ranked in New Jersey.
State Area:

Concept: The vegetation grows attached to rocks in outcrops and stream rubble or attached to dams in moderate- to fast-flowing water. This almost always is a monospecific community dominated by *Podostemum ceratophyllum* with no other vascular plants present. In the Central Appalachians and other ecoregions, this type represents vegetation of shoals in rocky streambeds and riverbeds in mature drainage systems where the streams have cut down to rock and the floodplain is relatively narrow, or on dams in moderately fast- to fast-flowing water. This almost always is a monospecific community with no other vascular plants present; some *Rhodophyta* (red algae) may be present. It tends to be associated with higher pH streams which cut through diabase, limestone or calcareous shales.

Comments: This vegetation has been documented from the Sepulga River in the East Gulf Coastal Plain of Alabama. In the Interior Low Plateau of Tennessee, this vegetation is known from the upper Duck River at Manchester (Old Stone Fort State Park).

Range: This community is wide-ranging, occurring in rivers throughout the eastern and southeastern United States.

Other States/Provinces: AL:S?, AR:S?, CT:S?, DE:S?, GA:S?, KY:S?, MA:S?, MD:S?, ME:S?, NC:S?, NH:S?, NY:S?, OK:S?, PA:S?, RI:S?, SC:S?, TN:S?, VA:S?, VT:S?

Physiographic Province, Section, Subsection: 221Ha:CCC, 221Hb:CCC, 221Hc:CCC, 221He:CCC, 222Eb:CCC, 222En:CCP, 222Eo:CCP, 231Af:CCC, 232Bj:CCC, M221Aa:CC?, M221Ab:CC?, M221Ac:CCC, M221Ad:CC?, M221Bb:C??, M221Bd:C??, M221Be:C??, M221Bf:C??, M221Da:CC?, M221Dc:CCC, M221Dd:CCC, M222Aa:CCC, M231Aa:CCC, M231Ab:CCC, M231Ac:CCC, M231Ad:CCC

Synonymy: River-weed shallow shore (CAP), No equivalent (Allard 1990), Mountain river (Wharton 1978)

References: Ambrose 1990a, Campbell et al. 1990, Hoagland 1997, Nelson 1986, Schafale and Weakley 1990, Wharton 1978

Authors: SCS **Confidence:** 2 **Identifier:** CEGL004331

V.C.2.N.a.17. VALLISNERIA AMERICANA PERMANENTLY FLOODED TEMPERATE HERBACEOUS ALLIANCE

American Eel-grass Permanently Flooded Temperate Herbaceous Alliance

Concept: Aquatic vegetation in alluvial rivers dominated by *Vallisneria americana*. The extent and distribution of this alliance is poorly understood. *Heteranthera dubia (= Zosterella dubia)* may be locally abundant. The habitat includes alluvial rivers, above or extending to the upper limit of tidal influence. Stands are dominated by submergent or emergent plants with only minor floating-leaved components.

Comments:

Range: This alliance occurs in Iowa, Connecticut, Delaware, Massachusetts, Maryland, Maine, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, Kentucky, Virginia, West Virginia, and North Carolina; and in Canada in Ontario. It may occur in the Coastal Plain of Alabama, Georgia, and Mississippi.

Other States/Provinces: AL? CT DE GA? IA KY MA MD ME MS? NC NH NJ NY ON PA RI SC? TN VA VT WV

Physiographic Province, Section, Subsection: 212Cb:CCC, 221Hc:CCC, 231:C, 232B:CP, 232Dc:CCC, 251:P, M212:C, M221Aa:CCC, M221Ab:CCP, M221Ac:CCC, M221Ad:CC?, M221Ba:CPP, M221Bb:CP?, M221Bc:CP?, M221Bd:CP?, M221Be:CP?, M221Bf:CP?, M221Da:CP?, M221Db:CPP, M221Dc:CPP
Synonymy:
References: Faber-Langendoen et al. 1996
Authors: MP, ECS **Identifier:** A.1757

VALLISNERIA AMERICANA—POTAMOGETON PERFOLIATUS HERBACEOUS VEGETATION
American Eel-grass—Clasping-leaf Pondweed Herbaceous Vegetation
[Open Water Marsh with Mixed Submergents/Emergents] **G5**
S4 01-08-16

State Estimated EO's: CD
State Area: U—Patch size probably 1/4–5 acres; all major rivers outside of outer C.P.; in Delaware R. Corridor outside of brackish areas.

Concept: This aquatic vegetation of sheltered bays of the northeastern United States occurs on lakes and streams where it is not highly disturbed by wave action. The vegetation is dominated by submergent or emergent plants with only minor floating-leaved components. Characteristic species may include *Vallisneria americana, Potamogeton perfoliatus, Potamogeton epihydrus, Utricularia* spp., and *Eriocaulon aquaticum*.
Comments:
Range:
Other States/Provinces: CT:S?, DE:S?, MA:S?, MD:S?, ME:S?, NH:S?, NY:S?, PA:S?, RI:S?, VT:S?, WV:S?
Physiographic Province, Section, Subsection: 212Cb:CCC, **221**:C, 231:?, **232**:P, M212:C, M221Aa:CCC, M221Ab:CC?, M221Ac:CCC, M221Ad:CC?, M221Ba:C??, M221Bb:C??, M221Bc:C??, M221Bd:C??, M221Be:C??, M221Bf:C??, M221Da:C??
Synonymy: Tape-grass shallow shore (CAP)
References:
Authors: ECS **Confidence:** 3 **Identifier:** CEGL006196

V.C.2.N.b. Permanently flooded-tidal temperate or subpolar hydromorphic rooted vegetation

V.C.2.N.b.4. RUPPIA MARITIMA PERMANENTLY FLOODED—TIDAL TEMPERATE HERBACEOUS ALLIANCE

Beaked Ditch-grass Permanently Flooded—Tidal Temperate Herbaceous Alliance

Concept: This alliance includes communities of submerged, rooted aquatic vegetation occurring in tidal creeks, pools, and coves with brackish waters. The substrate is often mud-bottomed but may also include sand. Characteristic species include *Ruppia maritima, Vallisneria americana*, and *Stuckenia pectinata (= Potamogeton pectinatus)*. This is the most widely distributed seagrass alliance in eastern North America. It ranges around the entire Atlantic and Gulf coasts, from New England to Texas. This vegetation is patchily distributed along the Texas coast, where *Ruppia maritima* often occurs mixed with *Halodule beaudettei*. *Ruppia maritima* is the only seagrass capable of growing in freshwater and is therefore often found in the oligohaline to mesohaline upper reaches of estuaries and lower reaches of tidal creeks, bayous and rivers. Because it often behaves as an annual, the distribution and abundance of *Ruppia maritima* is often

shifting both spatially and temporally.

Comments: Because floristic composition of occurrences of this alliance are similar, but the composition of other biota are thought to differ with geographic distribution, this alliance has been separated into several associations based on marine biogeographic provinces.

Range: This is the most widely distributed seagrass alliance in eastern North America. It ranges around the entire Atlantic and Gulf coasts, from New England to Texas. It is found in Florida, Louisiana, Mississippi, North Carolina, Texas, Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, and Virginia, and possibly Alabama (?), Georgia (?), and South Carolina (?).

Other States/Provinces: AL? CT DE FL GA? LA MA MD ME MS NC NH NJ NY RI SC? TX VA

Physiographic Province, Section, Subsection: 221Ak:CCC, **221B:**CC, 231Fb:PPP, **232Ac:**CCC, 232Bx:CPP, 232Bz:CPP, 232Cb:CPP, 232Ce:CPP, 232Ci:CPP, 232Db:CCP, 232Dc:CCC, 232Dd:CCP, 232De:CCP, 232Eb:CPP, 232Ee:CPP, 232Gb:CPP, 255Da:CC?, 255Dc:CCC

Synonymy: Wigeon Grass Bed (Wieland 1994a); Wigeon Grass Bed (Wieland 1994b)

References: Kantrud 1991, Wieland 1994a, Wieland 1994b

Authors: A.S. WEAKLEY, JT, SCS **Identifier:** A.1769

RUPPIA MARITIMA ACADIAN/VIRGINIAN ZONE TEMPERATE HERBACEOUS VEGETATION

Beaked Ditch-grass Acadian/Virginian Zone Temperate Herbaceous Vegetation

G?

S3S4 01-08-16

State Estimated EO's: D—50–200? (based on est. of Spart. alt. marshes).

State Area: D—Patch size ranges 25–500 acres (based on 5% of acreage of Spart. alt. marshes).

Concept: This brackish tidal community occurs in brackish tidal creeks or salt marsh pools along the central and northern Atlantic coast. Substrates are sand or muck, and salinity is generally brackish. Vascular plant associates are few and may include *Vallisneria americana* and *Potamogeton* species. Algae are common, particularly *Cladophora* species.

Comments:

Range:

Other States/Provinces: CT:S?, DE:S?, MA:S?, MD:S?, ME:S?, NC?, NH:S?, NY:S?, RI:S?, VA:S?

Physiographic Province, Section, Subsection: 221A:CC, **221B:**CC, **232Ac:**CCC, 232C:CP

Synonymy:

References:

Authors: ECS **Confidence:** 2 **Identifier:** CEGL006167

V.C.2.N.b.3. STUCKENIA PECTINATA—ZANNICHELLIA PALUSTRIS PERMANENTLY FLOODED—TIDAL HERBACEOUS ALLIANCE

Sago Pondweed—Horned Pondweed Permanently Flooded—Tidal Herbaceous Alliance

Concept: This alliance includes shallow subtidal brackish water and sediments exposed at extreme low tide. It supports a predominance of vascular aquatics such as *Stuckenia pectinata (= Potamogeton pectinatus), Zannichellia palustris*, and occasionally *Ruppia maritima*. A nonvascular component can be present and may include the algae *Ulva lactuca* and *Enteromorpha* spp. Communities in this alliance occur in maritime coastal areas from Virginia north to Connecticut and in Louisiana and possibly Texas.

Comments:

Range: This alliance is found in maritime coastal areas of Louisiana, Connecticut, Delaware, Maryland, New Jersey, Virginia, and possibly Texas. It is present in tidal waters of Lake

Pontchartrain, Louisiana (L. Smith pers. comm.).
Other States/Provinces: CT DE LA MD NJ NY TX? VA
Physiographic Province, Section, Subsection: 221A:CC, **221B:**CP, 231Fb:PPP, 232Aa:CPP, 232B:CC, 232Ec:CCC, 255Dc:PPP
Synonymy:
References: L. Smith pers. comm., Sneddon et al. 1996
Authors: JT, ECS **Identifier:** A.1768

STUCKENIA PECTINATA—ZANNICHELLIA PALUSTRIS—(RUPPIA MARITIMA) PERMANENTLY FLOODED—TIDAL HERBACEOUS VEGETATION
Sago Pondweed—Horned Pondweed—(Beaked Ditch-grass) Permanently Flooded—Tidal Herbaceous Vegetation

G3G5
S2S3 01-08-16

State Estimated EO's: BC
State Area: C

Concept: Vegetation of shallow subtidal brackish water and sediments exposed at extreme low tide. Vascular aquatics predominate, such as *Stuckenia pectinata (= Potamogeton pectinatus), Zannichellia palustris*, and occasionally *Ruppia maritima*. A nonvascular component can be present and may include the algae *Ulva lactuca* and *Enteromorpha* spp. This vegetation occurs in maritime coastal areas from Virginia north to Connecticut.
Comments:
Range:
Other States/Provinces: CT:S?, DE:S?, MD:S?, NY:S?, VA:S?
Physiographic Province, Section, Subsection: 221A:CC, **221B:**CP, 232Aa:CPP, 232B:CC
Synonymy:
References:
Authors: ECS **Confidence:** 2 **Identifier:** CEGL006027

V.C.2.N.b.1. ZOSTERA MARINA PERMANENTLY FLOODED—TIDAL HERBACEOUS ALLIANCE

Seawrack Permanently Flooded—Tidal Herbaceous Alliance

Concept: This alliance includes subtidal aquatic beds characterized by *Zostera marina*. These communities usually occur in quiet waters below the lowest tide level and where fluctuations in salinity are minor. Substrate ranges from soft mud to coarse sand. Light availability is the primary limiting factor in occurrences of this alliance, within the geographic, temperature, and salinity range (10–30 ppt) of *Zostera marina*. The long leaves of *Zostera marina* provide substrate for epiphytic organisms such as macroalgae, bay scallops, and other marine invertebrates, as well as nursery and/or adult habitat for fin fish. Characteristic associate nonvascular plants (algae) include *Ulva lactuca, Enteromorpha* spp., and *Polysiphonia* spp.
Comments:
Range: This alliance is found in North Carolina, Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, and Virginia, and in Canada in Nova Scotia.
Other States/Provinces: CT DE MA MD ME NC NH NJ NY RI VA
Physiographic Province, Section, Subsection: 212Cb:PPP, 212Da:PPP, 212Db:PPP, 221Aa:CCP, 221Ab:CCP, 221Ac:CCP, 221Ad:CCP, 221Ak:CCP, **221B:**CC, 232Aa:CCP, 232Bb:CPP, 232Bc:CPP, 232Bd:CPP, 232Ch:CCP, 232Ci:CCC, 232Cj:CCP
Synonymy:
References: Sneddon et al. 1996, Thayer et al. 1984

Authors: JT, ECS **Identifier:** A.1766

ZOSTERA MARINA HERBACEOUS VEGETATION [PLACEHOLDER]
Seawrack Herbaceous Vegetation

G?
S3 01-08-16

State Estimated EO's: AC
State Area: U—Estimate state average between 1,000 to >10,000 acres. Need more data. Patch sizes can be more than 50 acres.

Concept: This is a placeholder for community association(s) to be developed in this alliance.
Comments:
Range:
Other States/Provinces: CT:S?, DE:S?, MA:S?, MD:S?, ME:S?, NC:S?, NH:S?, NY:S3, RI:S?, VA:S?
Physiographic Province, Section, Subsection: 221A:CC, **221B:**CC, **232A:**CC, 232Ci:CCC
Synonymy:
References: Thayer et al. 1984
Authors: ECS **Confidence:** 3 **Identifier:** CEGL004336

VII. Sparse Vegetation

VII. Sparse Vegetation

VII.C.2.N.a. Sand flats

VII.C.2.N.a.2. CAKILE EDENTULA SPARSE VEGETATION ALLIANCE

Sea-rocket Sparse Vegetation Alliance

Concept: Annual-dominated sand flats on island end flats and upper ocean beaches, within the reach of storm tides and extreme lunar tides. This alliance has less perennial species than the related *Cakile constricta* Sparsely Vegetated Alliance (A.1860), since the Atlantic Coast shoreline is a higher-energy system, and the alliance is more dynamic and more frequently disturbed. Vegetative cover is variable, depending on the amount of exposure to wave and wind action, but on average is sparse; no species can be considered dominant. Annual or biennial species more or less restricted to beach habitats are characteristic of this alliance, including *Cakile edentula ssp. edentula*, as well as *Salsola kali ssp. kali (= Salsola caroliniana), Chamaesyce polygonifolia, Honckenya peploides, Cenchrus tribuloides, Amaranthus retroflexus, Chenopodium album, Erechtites hieraciifolia*, and *Atriplex cristata (= Atriplex arenaria)*. Associated species include *Ammophila breviligulata, Chamaesyce polygonifolia, Salsola kali ssp. kali*, and *Triplasis purpurea*. At Assateague Island National Seashore, this alliance is sparsely vegetated with *Cakile edentula ssp. edentula*, covering approximately 1% of the area. Other associated species in this alliance are just as sparse and generally adapted to a low growth form, given the exposed windy conditions of their environment. The South Atlantic Coast phase of this alliance occupies the upper portion of ocean beaches in the southern part (Cape Hatteras, North Carolina, to Cape Romain, South Carolina) of the microtidal region

Photos above:
Cakile edentula ssp. *Edentula,—Salsola caroliniana* Sparse Vegetation—color slide by Tom Breden

(barrier islands with coastal geomorphology dominated by hurricane overwash rather than tidal energy). Other characteristic species include mostly annual herbs, such as *Chamaesyce polygonifolia, Chamaesyce bombensis, Sesuvium portulacastrum, Salsola kali ssp. kali*, and the rare *Amaranthus pumilus*. In addition to the two associations in the Southeast, there is also an association in the Great Lakes; in this association the dominant plant is *Cakile edentula ssp. edentula var. lacustris*.

Comments:

Range: This alliance is found in Florida (?), Georgia (?), North Carolina, South Carolina, Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, Virginia, Illinois, Indiana, Michigan, Ohio, and Wisconsin; and in Canada in Ontario.

Other States/Provinces: CT DE FL? GA? IL IN MA MD ME MI NC NH NJ NY OH ON PA RI SC VA WI

Physiographic Province, Section, Subsection: 212Cb:CCC, 212Db:CPP, 212Dc:CPP, 212Ec:CPP, 212Hd:CCC, 212He:CCC, 212Hi:CCP, 212Hj:CCC, 212Hw:CCP, 212Ia:CPP, 212Ja:CPP, 212Oa:CCC, 212Ob:CCC, 221Aa:CCP, 221Ab:CCP, 221Ac:CCP, 221Ad:CCP, 221Ak:CCP, 222Ia:CCC, 222If:CCC, 222Jj:CCC, 222Kg:CCC, 222Qa:CCC, **232Ac:**CCC, 232Bb:CCP, 232Bc:CCP, 232Bd:CCP, 232Bx:CCC, 232Bz:CCC, 232Cb:CCP, 232Ce:CCC, 232Ch:CCP, 232Ci:CCC, M411A:CC

Synonymy: Upper Beach, in part (Schafale and Weakley 1990); Maritime Grassland, in part (Nelson 1986); Beach community (Hill 1986); Beach community (Johnson 1985b); Beach community (Baumann 1978b); beach (Higgins et al. 1971); beach (Fender 1937); beach (McDonnell 1979); pioneer beach community (Boule 1979); dune-strand area (Clovis 1968); dune community (Jenkins 1974); middle beach (Shreve et al. 1910); middle beach (Nichols 1920); *Cakiletum edentula* (Conard 1935); sea-strand vegetation, beach formation (Harshberger 1900); embryo dune (Klotz 1986); maritime beach (Reschke 1990); beach vegetation (Moul 1973); marine sandy beach (Clancy 1993); marine intertidal gravel/sand beach community (Breden 1989); coastal beach strand (Sperduto 1994); Beach strand community (Maine Natural Heritage Program (MENHP) 1991); *Cakile edentula-Chenopodium album* community (Metzler and Barrett 1992); dune and swale community, in part (Stalter 1990)

References: Baumann 1978b, Boule 1979, Breden 1989, Clancy 1993, Clovis 1968, Conard 1935, Fender 1937, Harshberger 1900, Higgins et al. 1971, Hill 1986, Jenkins 1974, Johnson 1985b, Klotz 1986, Maine Natural Heritage Program (MENHP) 1991, McDonnell 1979, Metzler and Barrett 1992, Moul 1973, Nelson 1986, Nichols 1920, Reschke 1990, Schafale and Weakley 1990, Shreve et al. 1910, Sperduto 1994, Stalter 1990

Authors: JT, ECS **Identifier:** A.1861

CAKILE EDENTULA SSP. EDENTULA—CHAMAESYCE POLYGONIFOLIA SPARSE VEGETATION

Sea-rocket—Northern Seaside Spurge Sparse Vegetation

[North Atlantic Upper Ocean Beach] **G4G5**

S1S2 01-08-16

State Estimated EO's: B

State Area: B—Patch sizes range 1–75 acres.

Concept: This community occurs on maritime beaches that are subject to irregular tidal flooding, generally spring or storm tides in maritime settings. Vegetation cover is variable, depending on the amount of exposure to wave and wind action, but on average is sparse. This community is sparsely vegetated on average, so no species can be considered dominant. Annual or biennial species more or less restricted to beach habitats are characteristic of this community, including *Cakile edentula ssp. edentula*, as well as *Salsola kali ssp. kali (= Salsola caroliniana), Chamaesyce polygonifolia, Honckenya*

peploides, Cenchrus tribuloides, Amaranthus retroflexus, Chenopodium album, Erechtites hieraciifolia, and *Atriplex cristata (= Atriplex arenaria)*. Sparse *Ammophila breviligulata* is also a common associate. Diagnostic species are *Cakile edentula ssp. edentula, Salsola kali ssp. kali, Atriplex cristata (= Atriplex pentandra)*, and *Chamaesyce polygonifolia*. At Assateague Island National Seashore, this community is sparsely vegetated with *Cakile edentula ssp. edentula*, covering approximately 1% of the area. Other associated species in this community are just as sparse and generally adapted to a low growth form, given the exposed windy conditions of their environment. Associated species include *Ammophila breviligulata, Chamaesyce polygonifolia, Salsola kali ssp. kali*, and *Triplasis purpurea*; constituting less than additional percentage of vegetation cover, combined. Usually 95-99% of the substrate is unvegetated sand. *Amaranthus pumilus* is a globally rare species occurring in this community, but is thought to have been extirpated from Assateague Island. At Assateague Island, this community occurs on the unconsolidated sands of the beach and foredunes. This community occurs in maritime coastal areas from southern Maine to Cape Hatteras, North Carolina.

Comments: This community is common on maritime dunes of the Northeast, but is vulnerable to development and shifting wave action due to jetties.

Range:

Other States/Provinces: CT:S?, DE:S?, MA:S?, MD:S?, ME:S?, NC:S?, NH:S?, NY:S?, RI:S?, VA:S?

Physiographic Province, Section, Subsection: 221A:CC, **232Ac:**CCC, 232B:CC, 232C:CC, M411A:CC

Synonymy: Beach community (Baumann 1978b), Beach community (Hill 1986), Beach community (Johnson 1985b), beach (Fender 1937), Beach (Higgins et al. 1971), beach (McDonnell 1979), pioneer beach community (Boule 1979), dune-strand area (Clovis 1968), dune community (Jenkins 1974), middle beach (Shreve et al. 1910), middle beach (Nichols 1920), *Cakiletum edentula* (Conard 1935), sea-strand vegetation, beach formation (Harshberger 1900), Embryo dune (Klotz 1986), Maritime beach (Reschke 1990), beach vegetation (Moul 1973), marine sandy beach (Clancy 1993), marine intertidal gravel/sand beach community (Breden 1989), coastal beach strand (Sperduto 1994), Beach strand community (Maine Natural Heritage Program (MENHP) 1991), *Cakile edentula—Chenopodium album* community (Metzler and Barrett 1992), Dune and swale community, in part (Stalter 1990)

References: Baumann 1978b, Boule 1979, Breden 1989, Clancy 1993, Clovis 1968, Conard 1935, Fender 1937, Harshberger 1900, Higgins et al. 1971, Hill 1986, Jenkins 1974, Johnson 1985b, Klotz 1986, Maine Natural Heritage Program (MENHP) 1991, McDonnell 1979, Metzler and Barrett 1992, Moul 1973, Nichols 1920, Reschke 1990, Schafale and Weakley 1990, Shreve et al. 1910, Sperduto 1994, Stalter 1990

Authors: ECS **Confidence:** 2 **Identifier:** CEGL004400

VII.C.4.N.d. Tidal mud flats

VII.C.4.N.d.1. ISOETES RIPARIA TIDAL SPARSE VEGETATION ALLIANCE

Riverbank Quillwort Tidal Sparse Vegetation Alliance

Concept: Mudflats with *Isoetes riparia*. This alliance includes communities occurring on the upper limits of freshwater intertidal shores. The vegetation can be quite sparse with few plants growing in patches within the open sand. Associated species include *Cyperus bipartitus (= Cyperus rivularis), Eleocharis obtusa (= Eleocharis obtusa var. peasei)*, and in more muddy areas, *Schoenoplectus smithii (= Scirpus smithii)*. Occurs in coastal areas discontinuously from Massachusetts south to New Jersey, Virginia, and North Carolina.
Comments:
Range: Occurs in coastal areas discontinuously from Massachusetts south to New Jersey, Virginia, and North Carolina. This alliance is found in North Carolina, Connecticut, Delaware, Maryland, Massachusetts, New Jersey, New York, Rhode Island, and Virginia.
Other States/Provinces: CT DE MA MD NC NJ NY RI VA
Physiographic Province, Section, Subsection: 221A:??, **232A:**C?, 232C:C?
Synonymy: No equivalent (Schafale and Weakley 1990)
References: Sneddon et al. 1996
Authors: ECS, JT, ECS **Identifier:** A.1879

ISOETES RIPARIA TIDAL SPARSE VEGETATION
Riverbank Quillwort Tidal Sparse Vegetation

G?
S2S3 01-08-16

State Estimated EO's: BC
State Area: C—Patch sizes may range <1–50 acres.

Concept: This freshwater tidal flat community of the central and northern Atlantic coast occurs on mud, sand, or gravelly banks of freshwater tidal streams. The vegetation is sparse, but is characterized by *Isoetes riparia*. Associated species include *Cyperus bipartitus (= Cyperus rivularis), Elatine americana, Sagittaria graminea, Sagittaria subulata, Gratiola virginiana, Eleocharis obtusa (= var. peasei)*, and in more muddy areas, *Schoenoplectus smithii (= Scirpus smithii)*.
Comments:
Range:
Other States/Provinces: CT:S?, DE:S?, MA:S?, MD:S?, NC:S?, NY:S?, RI:S?, VA:S?
Physiographic Province, Section, Subsection: 221A:??, **232A:**C?
Synonymy:
References: Bowman 2000
Authors: ECS **Confidence:** 2 **Identifier:** CEGL006058

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Appendix 1
Glossary of Terms

alluvial
characterized by the deposition of sediment by a stream or other running water at any point along its course.

alpine
the zone on mountain tops between permanent snow and the cold limits of trees.

annual
plant species that complete their life-cycles within a single growing season.

biennial
plant species that complete their life-cycles within two growing seasons.

boreal
northern biogeographical region typically referring to subpolar and cold temperate areas.

brackish
tidal water with a salinity of 0.5–30 parts per thousand.

broad-leaved
describes a plant with leaves that have well-defined leaf blades and are relatively wide in outline (shape) as opposed to needle-like or linear; leaf area is typically greater than 500 square millimeters or 1 square inch.

bryophyte
nonvascular, terrestrial green plant, including mosses, hornworts, and liverworts.

bunch grass
multi-stemmed (caespitose) life form of grasses characterized by clumps of erect shoots that slowly spread horizontally by tillers, generally creating distinct individual plants spaced across the ground; often applied to sedges and other graminoids with similar life forms.

caespitose (cespitose)
describes a low branching pattern from near the base that forms a multi-stemmed or a bunched appearance.

cliff
any high, very steep to perpendicular, or overhanging face of a rock outcrop.

cold-deciduous
describes a plant that sheds its leaves as a strategy to avoid seasonal periods of low temperature, often initiated by photoperiod; applied to vegetation adapted to seasonal cold season influences (temperate).

conical-crowned
describes a needle-leaved evergreen tree with a pyramidal or cone-shaped canopy or life form; for example, Douglas fir and silver fir *(Pseudotsuga menziesii and Abies amabilis).*

creeping
describes the pattern of stems growing at or just beneath the surface of the ground and usually producing roots at nodes.

crustose lichen
lichen life form that grows in intimate contact with its substrate, lacks a lower cortex and rhizoids (root-like structures), and is impossible to separate from the substrate without destroying the thallus; lichen with an unlobed, flattened thallus, growing adnate to the substrate.

cushion plant
a low, woody, plant life form so densely branched that it forms a compact canopy that is pad- or bolster-like in appearance; usually with microphyllous foliage; characteristic of alpine and tundra plants.

cylindrical-crowned
describes a needle-leaved evergreen tree with a narrow, essentially cylinder-shaped canopy or life form; for example, subalpine fir and black spruce *(Abies lasiocarpa and Picea mariana).*

deciduous
describes a woody plant that seasonally loses all of its leaves and becomes temporarily bare-stemmed.

deciduous vegetation
associations in which deciduous woody plants generally contribute 75 percent or more to total dominant plant cover.

dominant
an organism, group of organisms, or taxon that by its size, abundance, or coverage exerts considerable influence upon an association's biotic (such as structure and function) and abiotic (such as shade and relative humidity) conditions.

dwarf-shrub
low-growing shrub life form usually under 0.5 meters or 1.5 feet tall (never exceeding 1 meter or 3 feet tall) at maturity.

dwarf-shrubland
vegetation dominated by low-growing shrubs and/or trees, usually under 0.5 meters or 1.5 feet tall; dwarf-shrubs generally form greater than 25 percent cover, although (rarely) may be less, and tree and taller shrubs generally form less than 25 percent cover.

epiphyte
vascular plant that grows by germinating and rooting on other plants or other perched structures; sometimes called "air plants."

ericoid
plants of the Heath Family or Family Eriaceae; for example, heaths, rhododendrons, and blueberries *(Erica, Rhododendron, and Vaccinium).*

evergreen
describes a plant that has green leaves all year round; or a plant that in xeric habitats has green stems or trunks and never produces leaves.

evergreen vegetation
associations in which evergreen woody plants generally contribute 75 percent or more to total dominant plant cover; vegetation canopy is never without photosynthetic tissue.

foliose lichen
lichen life form that is leafy in appearance and loosely attached to its substrate; lichen with a lobed, flattened thallus growing loosely attached to the substrate, the lobes flattened or inflated with distinctly differentiated upper and lower surfaces; umbilicate lichens are included.

forb
a broad-leaved herbaceous plant.

forest
vegetation dominated by trees with their crowns overlapping, generally forming 60–100 percent cover; includes reproductive stages or immature secondary growth stands that are temporarily less than 5 meters or 16.5 feet tall.

fresh water
water with a salinity of less than 0.5 parts per thousand.

fruticose lichen
lichen life form that is bunched, shrubby or "hairy" in appearance and loosely attached to its substrate; lichen with the thallus branched, the branches solid, or hollow and round, or flattened without distinctly differentiated upper and lower surfaces; squamulose lichens are included.

graminoid
grasses, and grass-like plants including sedges and rushes.

grassland
vegetation dominated by perennial graminoid plants.

growth form
the shape or appearance of a plant.

hemi-sclerophyllous
describes a plant with stiff, firm, leathery leaves that partially retain their rigidity during wilting; for example, rhododendron and salal *(Rhododendron and Gaultheria).*

herb
a vascular plant without significant woody tissue above or at the ground; an annual, biennial, or perennial plant lacking significant thickening by secondary woody growth, with perennating buds borne at or below the ground surface (hemicryophytes, geophytes, helophytes, and therophytes of Raunkier).

herbaceous vegetation
vegetation in which herbs (mostly graminoids, forbs, and ferns) form at least 25 percent cover, and woody vegetation has generally less than 25 percent cover; herbaceous cover may be less than 25 percent in cases where the cover of each of the other life forms present is less than 25 percent and herbaceous cover exceeds the cover of the other life forms.

hygromorphous herbs
herbaceous plants structurally adapted for life in water-dominated or aquatic habitats.

intermittently flooded
substrate is usually exposed, but surface water can be present for variable periods without detectable seasonal periodicity. Inundation is not seasonally predictable and is dependent upon highly localized rain storms. This modifier was developed for use in the arid West for water regimes of Playa lakes, intermittent streams, and dry washes but can be used elsewhere when appropriate. This modifier can be applied to both wetland and non-wetland situations. Equivalent to Cowardin's Intermittently Flooded modifier.

irregularly exposed
land surface is exposed by tides less often than daily; the area from mean low tide to extreme low spring tide. Equivalent to Cowardin's Irregularly Exposed.

irregularly flooded
tidal water floods land surface less often than daily. The area must be flooded by tides at least once yearly as a result of extreme high spring tide plus wind plus flow. The area extends from mean high water inland to the maximum extent of tide plus the splash zone. Equivalent to Cowardin's Irregularly Flooded except in tidal Riverine, Lacustrine, and Palustrine areas where if an area is only irregularly flooded by fresh tidal waters, the appropriate non-tidal modifier, e.g., Temporarily Flooded, Seasonally Flooded, Semipermanently Flooded, applies.

lichen
an organism generally recognized as a single plant that consists of a fungus and an alga or cyanobacterium living in symbiotic association.

life form
the shape or appearance of a plant that mostly reflects inherited or genetic influences.

lignified
describes a plant with woody tissue developed by secondary cell wall thickening by lignin and cellulose.

low forb
a broad-leaved herbaceous plant usually less than 1 meter or 3 feet tall when inflorescences are fully developed.

lowland
a large land area with vegetation reflecting limits set by regional climate and soil/site conditions; an area where elevation is not the primary gradient affecting vegetation zonation.

matted
describes a creeping plant that by reiterative growth has overlapping stems and forms a low, dense ground cover.

medium-tall grassland
graminoid-dominated vegetation usually between 0.5 to 1 meter or 1.5 to 3 feet tall when inflorescences are fully developed in temperate zones, and to 2 meters or 6 feet in tropical zones.

microphyllous
describes a plant with small leaves; individual leaf surface areas are less than 500 sq. mm or one square inch.

mixed evergreen-deciduous
describes vegetation in which evergreen and deciduous species each generally contribute 25–75 percent to the total canopy cover.

montane
describes the zone in mountainous regions where the influence of altitude (vertical relief) results in local climatic regimes that are sufficiently different from those in the adjacent lowlands as to cause a complex vertical climate-vegetation-soil zonation; includes vegetation at the base of a mountain when it is different from lowland vegetation.

natural/semi-natural
describes vegetation that has not been planted or treated with an annual management or manipulation regime.

needle-leaved
describes a plant with slender, elongated leaves; for example, pine and fir trees (*Pinus and Abies).*

nonvascular plant
a plant without specialized water or fluid conductive tissue (xylem and phloem); includes bryophytes, lichens, and algae.

nonvascular vegetation
vegetation that is dominated by bryophytes and lichens, generally forming at least 25 percent cover, with other vegetation forming less than 25 percent cover; nonvascular cover may be less than 25 percent in cases where the cover of each of the other life forms present is less than 25 percent and nonvascular cover exceeds the cover of other life forms.

perennial
plant species with a life-cycle that characteristically lasts more than two growing seasons and persists for several years.

perennial herbaceous vegetation
associations that persist for several years and are dominated by herbaceous species.

planted/cultivated
describes vegetation planted by humans and/or treated with annual management; usually dominated by plants not indigenous to the area.

polar
geographically, the areas within the Arctic and Antarctic circles in which the sun is entirely not visible for six months, and is constantly above the horizon for the next six months; climatically, polar regions are characterized by the lack of a period of warmth and by enduring cold; in polar climates the average temperature of each month is below 10º C (50º F).

regularly flooded
tidal water alternately floods and exposes the land surface daily, from mean low (lower low on West Coast) to mean high (higher high on West Coast). Equivalent to Cowardin's Regularly Flooded.

revolute
rolled toward the lower surface of a leaf.

rosulate
a plant with leaves arranged in rosettes (circular clusters).

rounded-crowned
describes a needle-leaved evergreen tree with a basically semi-circular canopy or life form; for example, whitebark pine and alligator juniper *(Pinus albicaulis and Juniperus deppeana).*

saltwater
water with a salinity of greater than 30 parts per thousand.

saturated
surface water is seldom present, but substrate is saturated to surface for extended periods during the growing season. Equivalent to Cowardin's Saturated modifier.

scale-leaved
describes a plant with small, overlapping leaves that usually lie flat on the stem; for example, eastern red-cedar and western red-cedar *(Juniperus virginiana and Thuja plicata).*

sclerophyllous
describes a plant with usually evergreen leaves that are stiff and firm and retain their stiffness even when wilted; they are common in, but not restricted to, regions with a long summer drought and predictable yet limited winter rain.

scree
a sheet of coarse rock debris covering a mountain slope without an adjacent cliff.

scrub
vegetation dominated by shrubs, including thickets.

seasonal
showing periodicity related to the seasons; applied to vegetation exhibiting pronounced seasonal periodicity marked by conspicuous physiognomic changes.

seasonal evergreen vegetation
associations in which most of the upper canopy plants retain leaves year-round and drop some leaves during unfavorable seasons.

seasonally flooded
surface water is present for extended periods during the growing season, but is absent by the end of the growing season in most years. The water table after flooding ceases is very variable, extending from saturated to a water table well below the ground surface. Includes Cowardin's Seasonal, Seasonal-Saturated, and Seasonal-Well Drained modifiers.

semipermanently flooded
surface water persists throughout growing season in most years except during periods of drought. Land surface is normally saturated when water level drops below soil surface. Includes Cowardin's Intermittently Exposed and Semipermanently Flooded modifiers.

shrub
perennial woody species with a life form that is usually less than 4 to 5 meters or 13 to 16 feet in height; typically, plants have several stems arising from or near the ground, but this term includes short tuft-tree, bamboo, and woody vine species; length of vine may exceed 5 meters; shrub species growth form may be taller than 5 meters or single-stemmed under certain environmental conditions.

shrubland (scrub)
vegetation dominated by shrubs greater than 0.5 meters or 1.5 feet and typically less than 4 to 5 meters or 13 to 16 feet in height, forming greater than 25 percent cover, with trees forming less than 25 percent cover; shrub cover may be less than 25 percent in cases where the cover of each of the other life forms present is less than 25 percent and the shrub cover exceeds the cover of other life forms; does not include developing secondary associations dominated by tree species.

sod grass
a life form of graminoids that tends to develop a solid mat of grass, sedge, etc. over the ground by vegetative increase of rhizomes or stolons; resulting vegetation generally has few spaces between plants.

sparsely vegetated
describes vegetation with low total plant cover (generally less than 10 percent) that is scattered or nearly absent (less than 1 percent); areas with high cover of crustose lichen and no other vegetation are included here.

stomata
pores or openings for gas exchange that are generally concentrated on leaf surfaces.

subalpine
upper mountain vegetation immediately below the cold limits of tree and tall shrub growth.

submontane
an area where the influence of altitude (vertical relief) does not result in local climate regimes that are sufficiently different from the adjacent lowlands as to cause a complex vegetation-climate-soil zonation; generally includes the foothills of a mountain range; the lowland vegetation at the base of a mountain that displays vegetation zonation.

subpolar
geographically, the region immediately equatorward of the Arctic and Antarctic circles; climatically, winters are long and extremely cold, and summers are very short; only one month per year has a monthly average warmer than 10° C (50° F); as a rule, the ground is completely covered by snow for at least half a year; the region between the tundra and cold temperate forests or steppes.

succulent
a plant with fleshy stems or leaves with specialized tissue for the conservation of water; a xeromorphic strategy for tolerating long periods of drought.

tall grassland
graminoid-dominated vegetation usually over 1 meter or 3 feet tall when inflorescences are fully developed in temperate zones, and greater than 2 meters or 6 feet in tropical zones.

tall forb
broad-leaved herbaceous plants usually greater than 1 meter or 3 feet tall when inflorescences are fully developed.

talus
a sloping accumulation of coarse rock fragments at the base of a cliff.

temperate
geographically, the region between the polar and tropical regions; climatically, the region is moderate with distinct seasons of alternating long, warm summers and short, cold winters.

temporarily flooded
surface water present for brief periods during growing season, but water table usually lies well below soil surface. Often characterizes flood-plain wetlands. Equivalent to Cowardin's Temporary modifier.

tree
perennial, woody species life form with a single stem (trunk), normally greater than 4 to 5 meters or 13 to 16 feet in height; under certain environmental conditions, some tree species may develop a multi-stemmed or short growth form (less than 4 meters or 13 feet in height).

treeline
a zone where the normal growth of trees is limited; cold temperatures often combined with drought form the upper or arctic treeline, and drought combined with hot temperatures form the lower or arid treeline.

tropical
geographically, the area between the Tropic of Cancer (23º 27′ N) and the Tropic of Capricorn (23º 27′ S), which includes tropical montane and alpine zones; climatically, the tropics are described as either the equatorial limits of freeze or, in temperate marine locations without freezing, the 65º F isotherm for the coldest month of the year; generally, tropical regions are characterized by high mean temperatures, small annual variation in temperature, and abundant rainfall throughout the year, although mountainous areas within the tropics are more variable.

tuft-tree
woody plant with large leaf-fronds or rosulate branches at the tips of major trunk(s); e.g., palms and tree ferns.

tussock
graminoid life form consisting of bunch-like tufts, sometimes more than 1 meter or 3 feet tall, in which the hard, old, withered leaves are intermingled with the fresh, young, green leaves.

vascular plant
a plant with water and fluid conductive tissue (xylem and phloem); includes seed plants, ferns, and fern allies.

woody
containing lignified plant tissue.

woody plant
plant species life form with woody tissue and buds on that woody tissue near or at the ground surface or above; plants with limited to extensive thickening by secondary woody growth and with perennating buds; includes phanerophytes and chamaephytes of Raunkier.

xeromorphic
describes plants with morphological and physiological characters that tolerate persistently low water availability, such as succulence, specialized leaf surfaces for light reflectance or water retention, opportunistic leaf growth, leaf-size reduction with increased thickness and sunken stomata, revolute margins, or stem and leaf modification to form thorns or spines.

Appendix 2
Hydrologic Modifiers

TIDAL

irregularly exposed
land surface is exposed by tides less often then daily; the area from mean low tide to extreme low spring tide. *Equivalent to Cowardin's Irregularly Exposed.*

regularly flooded
tidal water alternately floods and exposes the land surface daily, from mean low (lower low on West Coast) to mean high (higher high on West Coast). *Equivalent to Cowardin's Regularly Flooded.*

irregularly flooded
tidal water floods land surface less often than daily. The area must be flooded by tides at least once yearly as a result of extreme high spring tide plus wind plus flow. The area extends from mean high water inland to the maximum extent of tide plus the splash zone. *Equivalent to Cowardin's Irregularly Flooded except in tidal Riverine, Lacustrine, and Palustrine areas where if an area is only irregularly flooded by fresh tidal waters, the appropriate non-tidal modifier, e.g., Temporarily Flooded, Seasonally Flooded, Semipermanently Flooded, will apply.*

NON-TIDAL

intermittently flooded
substrate is usually exposed, but surface water can be present for variable periods without detectable seasonal periodicity. Inundation is not seasonally predictable and is dependent upon highly localized rain storms. This modifier was developed for use in the arid West for water regimes of Playa lakes, intermittent streams, and dry washes but can be used elsewhere when appropriate. This modifier can be applied to both wetland and non-wetland situations. *Equivalent to Cowardin's Intermittently Flooded modifier.*

saturated
surface water is seldom present, but substrate is saturated to surface for extended periods during the growing season. *Equivalent to Cowardin's Saturated modifier.*

seasonally flooded
surface water is present for extended periods during the growing season, but is absent by the end of the growing season in most years. The water table after flooding ceases is very variable, extending from saturated to a water table well below the ground surface. *Includes Cowardin's Seasonal, Seasonal-Saturated, and Seasonal-Well Drained modifiers.*

semipermanently flooded
surface water persists throughout growing season in most years except during periods of drought. Land surface is normally saturated when water level drops below soil surface. *Includes Cowardin's Intermittently Exposed and Semipermanently Flooded modifiers.*

temporarily flooded
surface water present for brief periods during growing season, but water table usually lies well below soil surface. Often characterizes flood-plain wetlands. *Equivalent to Cowardin's Temporary modifier.*

Formation Code	Formation Name	Alliance Name	Key Code	Elcode	Association Name	Grank	Srank	Section 221A	Section 221B	Section 221D	Section 232A
I.A.4.N.a	Lowland temperate seasonal evergreen forest	ILEX OPACA FOREST ALLIANCE	A.3002								232Ab
				CEGL006376	Ilex opaca / Morella pensylvanica Forest	G1	S1				232Ab
I.A.8.N.g	Saturated temperate or subpolar needle-leaved evergreen forest	CHAMAECYPARIS THYOIDES SATURATED FOREST ALLIANCE	A.196					221Ae, 221Am	221Bd	221Dc	232Ab, 232Ac
				CEGL006188	Chamaecyparis thyoides / Ilex glabra Forest	G3	S3	221A	221B		232Ab, 232Ac
				CEGL006189	Chamaecyparis thyoides / Ilex verticillata Forest	G3	S1	221Ae	221B	221Dc	
				CEGL006355	Chamaecyparis thyoides / Rhododendron maximum Forest	G?	S1	221Ae		221Dc	
I.A.8.N.g	Saturated temperate or subpolar needle-leaved evergreen forest	PINUS TAEDA SATURATED FOREST ALLIANCE	A.3009								232Ab
				CEGL006137	Pinus taeda / Morella cerifera / Osmunda regalis var. spectabilis Forest	G2G3	S1?				232Ab
I.A.8.N.g	Saturated temperate or subpolar needle-leaved evergreen forest	TSUGA CANADENSIS SATURATED FOREST ALLIANCE	A.201					221Ae	221Ba, 221Bd		
				CEGL006226	Tsuga canadensis–Betula alleghaniensis / Ilex verticillata / Sphagnum spp. Forest	G5	S2	221A	221B		
				CEGL006279	Tsuga canadensis / Rhododendron maximum / Sphagnum spp. Forest	G?	S1S2	221Ae	221Bd		
I.B.2.N.a	Lowland or submontane cold-deciduous forest	ACER SACCHARUM–BETULA ALLEGHANIENSIS–(FAGUS GRANDIFOLIA) FOREST ALLIANCE	A.216					221Ae	221Ba, 221Bd		
				CEGL006252	Acer saccharum–Betula alleghaniensis–Fagus grandifolia / Viburnum lantanoides Forest	G3G5	S1S3	221Ae	221Ba		
I.B.2.N.a	Lowland or submontane cold-deciduous forest	ACER SACCHARUM–FRAXINUS AMERICANA–TILIA AMERICANA FOREST ALLIANCE	A.217					221Ae, 221Am	221Ba, 221Bd	221Da, 221Dc	
				CEGL005008	Acer saccharum–Fraxinus spp.–Tilia americana / Osmorhiza claytonii–Caulophyllum thalictroides Forest	G?	S2?	221A	221B		
				CEGL006020	Acer saccharum–Fraxinus americana–Juglans cinerea / Staphylea trifolia Forest	G?	S2	221Ae	221Ba	221Dc	
				CEGL006237	Acer saccharum–Fraxinus americana–Tilia americana–Magnolia acuminata / Actaea racemosa Forest	G?	S?			221D	
I.B.2.N.a	Lowland or submontane cold-deciduous forest	CARYA (GLABRA, OVATA)–FRAXINUS AMERICANA–QUERCUS (ALBA, RUBRA) FOREST ALLIANCE	A.258					221Ae	221Ba	221Da	
				CEGL006236	Carya (glabra, ovata)–Fraxinus americana–Quercus spp. Central Appalachian Forest	G?	S?			221D	
				CEGL006301	Quercus rubra–Carya (glabra, ovata) / Ostrya virginiana / Carex pensylvanica Forest	G?	S2S3?	221A	221B	221D	

Formation Code	Formation Name	Alliance Name	Key Code	Elcode	Association Name	Grank	Srank	Section 221A	Section 221B	Section 221D	Section 232A
I.B.2.N.a	Lowland or submontane cold-deciduous forest	FAGUS GRANDIFOLIA–QUERCUS RUBRA–QUERCUS ALBA FOREST ALLIANCE	A.229					221Ae		221Dc	232Ab, 232Ac
				CEGL006075	Fagus grandifolia–Quercus alba–Liriodendron tulipifera–Carya spp. Forest	G?	S3				232Ac
				CEGL006377	Fagus grandifolia–Quercus alba–Quercus rubra–Liriodendron tulipifera Forest	G?	S2	221Ae		221Dc	232Ab, 232Ac
				CEGL006378	Quercus velutina–Fagus grandifolia–Sassafras albidum / Ilex opaca Forest	G?		221A			232Ab
I.B.2.N.a	Lowland or submontane cold-deciduous forest	QUERCUS ALBA–(QUERCUS RUBRA, CARYA SPP.) FOREST ALLIANCE	A.239					221Ae, 221Am	221Ba	221Da, 221Dc	232Ac
				CEGL006336	Quercus (alba, rubra, velutina) / Cornus florida / Viburnum acerifolium Forest	G?	S4S5	221Ae, 221Am	221Ba	221Da, 221Dc	232Ac
I.B.2.N.a	Lowland or submontane cold-deciduous forest	QUERCUS ALBA–QUERCUS (FALCATA, STELLATA) FOREST ALLIANCE	A.241					221A		221Dc	232A
				CEGL006269	Quercus (falcata, alba, velutina) / Gaylussacia baccata–Vaccinium pallidum Forest	G4G5	S3S4				232Ab, 232Ac
I.B.2.N.a	Lowland or submontane cold-deciduous forest	QUERCUS FALCATA FOREST ALLIANCE	A.243								232Ab, 232Ac
				CEGL006390	Quercus falcata–Quercus phellos / Ilex opaca Forest	G?	S2S3				232Ab, 232Ac
I.B.2.N.a	Lowland or submontane cold-deciduous forest	QUERCUS MUEHLENBERGII–(ACER SACCHARUM) FOREST ALLIANCE	A.1912					221A	221B	221Dc	
				CEGL005010	Acer saccharum–Quercus muehlenbergii Forest	G?	S2	221A	221B	221D	
				CEGL006017	Acer saccharum–Quercus muehlenbergii / Cercis canadensis Forest	G4?	S?	221A		221D	
I.B.2.N.a	Lowland or submontane cold-deciduous forest	QUERCUS PRINUS–(QUERCUS COCCINEA, QUERCUS VELUTINA) FOREST ALLIANCE	A.248					221Ae, 221Am	221Ba, 221Bd	221Da, 221Dc	232Ac
				CEGL006282	Quercus prinus–Quercus (rubra, velutina) / Gaylussacia baccata Forest	G3G5	S3S4	221Ae, 221Am	221Ba	221Da, 221Dc	
I.B.2.N.a	Lowland or submontane cold-deciduous forest	QUERCUS PRINUS–QUERCUS (ALBA, FALCATA, RUBRA, VELUTINA) FOREST ALLIANCE	A.249								232Ab, 232Ac
				CEGL006334	Quercus prinus–Quercus velutina / Gaylussacia frondosa Forest	G?	S3				232Ab, 232Ac
				CEGL007260	Quercus prinus–Quercus (alba, falcata, rubra, velutina) Forest [Placeholder]	G?	S?				
I.B.2.N.a	Lowland or submontane cold-deciduous forest	QUERCUS PRINUS–QUERCUS RUBRA FOREST ALLIANCE	A.250					221Am		221Da	
				CEGL006057	Quercus prinus–Quercus rubra–Carya (glabra, alba) / Gaylussacia baccata Forest	G5?	S?	221Am		221Da	

Formation Code	Formation Name	Alliance Name	Key Code	Elcode	Association Name	Grank	Srank	Section 221A	Section 221B	Section 221D	Section 232A
I.B.2.N.a	Lowland or submontane cold-deciduous forest	QUERCUS RUBRA–(ACER SACCHARUM) FOREST ALLIANCE	A.251					221Ae, 221Am	221Ba, 221Bd	221Da, 221Dc	
				CEGL006125	Quercus rubra–Acer saccharum–Liriodendron tulipifera Forest	G?	S3S4			221D	
				CEGL006173	Quercus rubra–Acer saccharum–Fagus grandifolia / Viburnum acerifolium Forest	G?	S?	221A	221B	221D	
I.B.2.N.a	Lowland or submontane cold-deciduous forest	QUERCUS VELUTINA–QUERCUS ALBA–(QUERCUS COCCINEA) FOREST ALLIANCE	A.1911					221Ae		221Dc	232Ab, 232Ac
				CEGL006374	Quercus velutina–Quercus coccinea–Quercus prinus / Kalmia latifolia Forest	G?	S3	221Ae		221Dc	232Ab, 232Ac
				CEGL006375	Quercus coccinea–Quercus velutina / Sassafras albidum / Vaccinium pallidum Forest	G?	S1S3	221Ae		221Dc	232Ab
I.B.2.N.d	Temporarily flooded cold-deciduous forest	ACER SACCHARUM–CARYA CORDIFORMIS TEMPORARILY FLOODED FOREST ALLIANCE	A.302					221Ae	221Ba, 221Bd	221D	232A
				CEGL006114	Acer saccharum–Fraxinus spp.–Tilia americana / Matteuccia struthiopteris–Ageratina altissima Forest	G?	S2S3	221A	221B	221D	
I.B.2.N.e	Seasonally flooded cold-deciduous forest	ACER RUBRUM–FRAXINUS PENNSYLVANICA SEASONALLY FLOODED FOREST ALLIANCE	A.316					221Ae	221Ba	221Da, 221Dc	232A
				CEGL006406	Acer rubrum–Fraxinus (pennsylvanica, americana) / Lindera benzoin / Symplocarpus foetidus Forest	G4G5	S3S5	221Ae		221Da, 221Dc	232A
				CEGL006606	Acer rubrum–Fraxinus pennsylvanica / Saururus cernuus Forest	G?	S?				
I.B.2.N.e	Seasonally flooded cold-deciduous forest	LIQUIDAMBAR STYRACIFLUA–(ACER RUBRUM) SEASONALLY FLOODED FOREST ALLIANCE	A.321							221D	232Ab, 232Ac
				CEGL006110	Liquidambar styraciflua–Acer rubrum–Quercus phellos / Leucothoe racemosa Forest	G?	S3			221D	232Ab, 232Ac
I.B.2.N.g	Saturated cold-deciduous forest	ACER RUBRUM–NYSSA SYLVATICA SATURATED FOREST ALLIANCE	A.348					221Ae, 221Am	221Ba, 221Bd	221Da, 221Dc	232Ab, 232Ac
				CEGL006013	Acer rubrum–Nyssa sylvatica–Liquidambar styraciflua–Populus heterophylla Forest	G1	S1				232Ab
				CEGL006156	Acer rubrum–Nyssa sylvatica / Rhododendron viscosum–Clethra alnifolia Forest	G?	S4S5	221Ae	221B	221Dc	
				CEGL006238	Acer rubrum–Nyssa sylvatica–Magnolia virginiana Forest	G3?	S4S5				232Ab, 232Ac
I.B.2.N.g	Saturated cold-deciduous forest	FRAXINUS NIGRA–ACER RUBRUM SATURATED FOREST ALLIANCE	A.347					221Ae, 221Am	221Ba, 221Bd	221Da, 221Dc	232A
				CEGL006009	Fraxinus nigra–Acer rubrum–(Larix laricina) / Rhamnus alnifolia Forest	G?	S1S3	221A	221B		
I.C.3.N.a	Mixed needle-leaved evergreen–cold-deciduous forest	PINUS (RIGIDA, ECHINATA)–QUERCUS COCCINEA FOREST ALLIANCE	A.415					221Ae	221Ba	221D	232Ab, 232Ac

Formation Code	Formation Name	Alliance Name	Key Code	Elcode	Association Name	Grank	Srank	Section 221A	Section 221B	Section 221D	Section 232A
				CEGL006115	Pinus (rigida, echinata)–Quercus coccinea / Ilex opaca Forest	G?	S3				232Ab, 232Ac
				CEGL006381	Pinus rigida–Quercus coccinea / Vaccinium pallidum–(Morella pensylvanica) Forest	G?	S?	221A			232Ab
I.C.3.N.a	Mixed needle-leaved evergreen–cold-deciduous forest	PINUS STROBUS–QUERCUS (ALBA, RUBRA, VELUTINA) FOREST ALLIANCE	A.401					221Ae, 221Am	221Ba	221D	232A
				CEGL006293	Pinus strobus–Quercus (rubra, velutina)–Fagus grandifolia Forest	G5	S?	221Ae	221Ba		
I.C.3.N.a	Mixed needle-leaved evergreen–cold-deciduous forest	PINUS VIRGINIANA–QUERCUS (ALBA, STELLATA, FALCATA, VELUTINA) FOREST ALLIANCE	A.407								232Ab, 232Ac
				CEGL006354	Pinus virginiana–Quercus falcata–Carya pallida Forest	G?	S?				232Ab, 232Ac
I.C.3.N.a	Mixed needle-leaved evergreen–cold-deciduous forest	TSUGA CANADENSIS–BETULA ALLEGHANIENSIS FOREST ALLIANCE	A.412					221Ae, 221Am	221Ba, 221Bd	221Da, 221Dc	232Ac
				CEGL006109	Tsuga canadensis–Betula alleghaniensis Lower New England / Northern Piedmont Forest	G4?	S3	221A	221B	221D	232A
				CEGL006206	Tsuga canadensis–Betula alleghaniensis–Prunus serotina / Rhododendron maximum Forest	G?	S1S2		221Bd		
I.C.3.N.d	Saturated mixed needle-leaved evergreen–cold-deciduous forest	CHAMAECYPARIS THYOIDES–ACER RUBRUM SATURATED FOREST ALLIANCE	A.448					221Ae, 221Am	221Bd		232Ac
				CEGL006078	Chamaecyparis thyoides–Acer rubrum–Magnolia virginiana Forest	G?	S4				232Ac
				CEGL006207	Chamaecyparis thyoides–Acer rubrum Lower New England / Northern Piedmont Forest	G3G5	S1	221A			232A
I.C.3.N.d	Saturated mixed needle-leaved evergreen–cold-deciduous forest	PINUS RIGIDA–ACER RUBRUM SATURATED FOREST ALLIANCE	A.3005								232Ab
				CEGL006389	Pinus rigida–Acer rubrum / Rhododendron viscosum Forest	G?	S3S4				232Ab
II.A.4.N.a	Rounded-crowned temperate or subpolar needle-leaved evergreen woodland	PINUS RIGIDA WOODLAND ALLIANCE	A.524					221Ae, 221Am	221Ba, 221Bd		232Ab, 232Ac
				CEGL006051	Pinus rigida / Quercus (marilandica, ilicifolia) / Pyxidanthera barbulata Woodland	G2	S2				232Ab, 232Ac
				CEGL006117	Pinus rigida / Hudsonia tomentosa Woodland	G2	S1?	221A			232A
				CEGL006315	Pinus rigida / Quercus ilicifolia / Morella pensylvanica Woodland	G3	S?	221A			232Ab
				CEGL006323	Pinus rigida / Quercus ilicifolia / Photinia melanocarpa Woodland	G4G5	S1		221Bd		
				CEGL006383	Pinus rigida–(Pinus echinata) / Quercus (marilandica, ilicifolia) / Vaccinium pallidum Woodland	G2?	S3				232Ab

Formation Code	Formation Name	Alliance Name	Key Code	Elcode	Association Name	Grank	Srank	Section 221A	Section 221B	Section 221D	Section 232A
				CEGL006384	Pinus rigida / Quercus ilicifolia–Kalmia angustifolia / Pyxidanthera barbulata Woodland	G2?	S3				232Ab
				CEGL006385	Pinus rigida / Carex pensylvanica Woodland	G?	S2S3				232A
II.A.4.N.b	Conical-crowned temperate or subpolar needle-leaved evergreen woodland	JUNIPERUS VIRGINIANA WOODLAND ALLIANCE	A.545					221A			232A
				CEGL006002	Juniperus virginiana–Fraxinus americana / Danthonia spicata–Poa compressa Woodland	G2G3	S1S2			221Dc	
				CEGL006212	Juniperus virginiana var. virginiana / Morella pensylvanica Woodland	G2	S1	221A			232A
II.A.4.N.e	Seasonally flooded temperate or subpolar needle-leaved evergreen woodland	CHAMAECYPARIS THYOIDES SEASONALLY FLOODED WOODLAND ALLIANCE	A.571								232Ac
				CEGL006297	Chamaecyparis thyoides North Atlantic Coast Woodland	G3G4	S?				232A
II.A.4.N.f	Saturated temperate or subpolar needle-leaved evergreen woodland	PICEA MARIANA SATURATED WOODLAND ALLIANCE	A.585					221Ae	221Ba, 221Bd	221Dc	
				CEGL006098	Picea mariana / (Vaccinium corymbosum, Gaylussacia baccata) / Sphagnum sp. Woodland	G3G5	S1	221Ae	221Bd	221Dc	
II.A.4.N.f	Saturated temperate or subpolar needle-leaved evergreen woodland	PINUS RIGIDA SATURATED WOODLAND ALLIANCE	A.580					221A	221Ba, 221Bd	221D	232Ab
				CEGL006194	Pinus rigida / Chamaedaphne calyculata / Sphagnum spp. Woodland	G3G5	S3S4	221A			232Ab
				CEGL006195	Pinus rigida / Vaccinium corymbosum–Leucothoe racemosa / Sphagnum spp. Woodland	G3	S3S4				232A
				CEGL006387	Pinus rigida / Gaylussacia baccata–Kalmia angustifolia Woodland	G?	S4				232Ab
				CEGL006388	Pinus rigida / Gaylussacia dumosa / Calamovilfa brevipilis Woodland	G1	S1				232Ab
II.B.2.N.a	Cold-deciduous woodland	QUERCUS STELLATA–QUERCUS MARILANDICA WOODLAND ALLIANCE	A.625							221Dc	
				CEGL006372	Quercus stellata–Sassafras albidum / Smilax glauca Woodland	G?	S?			221Dc	
II.B.2.N.f	Tidal cold-deciduous woodland	ACER RUBRUM–FRAXINUS PENNSYLVANICA TIDAL WOODLAND ALLIANCE	A.658					221A	221Ba		232Ac
				CEGL006165	Acer rubrum–Fraxinus pennsylvanica / Polygonum spp. Woodland	G2	S1S2	221A			232A
II.C.3.N.a	Mixed needle-leaved evergreen–cold-deciduous woodland	PINUS RIGIDA–QUERCUS (COCCINEA, VELUTINA) WOODLAND ALLIANCE	A.687					221A	221B		232A
				CEGL006120	Pinus rigida–Quercus velutina / Hudsonia tomentosa Woodland	G3G5	S?	221A	221B		232A

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				CEGL006166	Pinus rigida–Quercus (coccinea, velutina) / Schizachyrium scoparium Woodland	G3G5	S?	221A	221B		
III.A.2.N.i	Saturated temperate broad-leaved evergreen shrubland	MORELLA CERIFERA SATURATED SHRUBLAND ALLIANCE	A.1906								232Ab
				CEGL003809	Morella cerifera–Baccharis halimifolia / Spartina patens Shrubland	G3G5	S?				232Ab
III.A.3.N.a	Needle-leaved evergreen shrubland	PINUS RIGIDA SHRUBLAND ALLIANCE	A.809						221Bd		232A
				CEGL006148	Pinus rigida–Quercus marilandica / Corema conradii Shrubland	G2	S1				232A
III.B.2.N.a	Temperate cold-deciduous shrubland	MORELLA PENSYLVANICA–(PRUNUS MARITIMA) SHRUBLAND ALLIANCE	A.902					221A			232Ab, 232Ac
				CEGL006295	Morella pensylvanica–Rosa rugosa Shrubland	G4	S1S2				232Ac
III.B.2.N.a	Temperate cold-deciduous shrubland	PRUNUS SEROTINA–AMELANCHIER CANADENSIS–QUERCUS SPP. SHRUBLAND ALLIANCE	A.237					221A		221D	232Ab, 232Ac
				CEGL006145	Prunus serotina–Sassafras albidum–Amelanchier canadensis / Smilax rotundifolia Shrubland	G2G3	S1S2	221A		221D	232Ab, 232Ac
				CEGL006319	Prunus serotina / Morella cerifera / Smilax rotundifolia Shrubland	G1G2	S1				232Ac
				CEGL006379	Amelanchier canadensis–Viburnum spp.–Morella pensylvanica Shrubland	G?	S?	221A			232Ab
III.B.2.N.a	Temperate cold-deciduous shrubland	QUERCUS ILICIFOLIA SHRUBLAND ALLIANCE	A.906								232A
				CEGL003883	Quercus ilicifolia Shrubland [Placeholder]	G?	S1				232A
III.B.2.N.e	Seasonally flooded cold-deciduous shrubland	ALNUS INCANA SEASONALLY FLOODED SHRUBLAND ALLIANCE	A.986								
				CEGL002381	Alnus incana Swamp Shrubland	G5?	S2S4	221A	221B	221D	
III.B.2.N.e	Seasonally flooded cold-deciduous shrubland	MORELLA (CERIFERA, PENSYLVANICA)–VACCINIUM FORMOSUM SEASONALLY FLOODED SHRUBLAND ALLIANCE	A.1010								232A
				CEGL003906	Morella (cerifera, pensylvanica)–Vaccinium formosum Shrubland	G?	S1S2				232A
III.B.2.N.e	Seasonally flooded cold-deciduous shrubland	VACCINIUM FORMOSUM–VACCINIUM FUSCATUM SEASONALLY FLOODED SHRUBLAND ALLIANCE	A.992								
				CEGL006371	Vaccinium corymbosum–Rhododendron viscosum–Clethra alnifolia Shrubland	G?	S1S3?				232Ab, 232Ac
III.B.2.N.g	Saturated cold-deciduous shrubland	BETULA PUMILA–(SALIX SPP.) SATURATED SHRUBLAND ALLIANCE	A.1021					221Ae	221Ba		

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				CEGL006360	Betula pumila–Toxicodendron vernix–Dasiphora fruticosa ssp. floribunda Shrubland	G2G3	S2S3	221Ae	221Ba		
III.B.2.N.g	Saturated cold-deciduous shrubland	CORNUS SERICEA–PHOTINIA MELANOCARPA–TOXICODENDRON VERNIX SATURATED SHRUBLAND ALLIANCE	A.1016					221Ae	221Ba		
				CEGL006359	Cornus amomum–Salix candida / Dasiphora fruticosa ssp. floribunda / Carex stricta Shrubland	G3?	S2S3	221Ae	221Ba		
III.B.2.N.g	Saturated cold-deciduous shrubland	VACCINIUM CORYMBOSUM SATURATED SHRUBLAND ALLIANCE	A.1018					221Ae, 221Am	221Ba, 221Bd	221Da, 221Dc	232Ac
				CEGL006190	Vaccinium corymbosum / Sphagnum spp. Shrubland	G3G5	S1S3	221A	221B		
III.B.2.N.h	Tidal cold-deciduous shrubland	ALNUS (INCANA, SERRULATA) TIDAL SHRUBLAND ALLIANCE	A.1024					221A			232Ab, 232Ac
				CEGL006337	Alnus (incana ssp. rugosa, serrulata)–Cornus amomum Shrubland	G?	S?	221A			232Ab, 232Ac
III.B.2.N.h	Tidal cold-deciduous shrubland	BACCHARIS HALIMIFOLIA–IVA FRUTESCENS TIDAL SHRUBLAND ALLIANCE	A.1023					221Ae		221Dc	232Ab, 232Ac
				CEGL003921	Baccharis halimifolia–Iva frutescens ssp. oraria / Spartina patens Shrubland	G5	S2S3				232A
				CEGL006063	Baccharis halimifolia–Iva frutescens / Panicum virgatum Shrubland	G5	S?	221A			232Ab
IV.A.1.N.a	Caespitose needle-leaved or microphyllous evergreen dwarf-shrubland	HUDSONIA TOMENTOSA DWARF-SHRUBLAND ALLIANCE	A.1062					221A			232Ac
				CEGL003950	Hudsonia tomentosa / Panicum amarum Dwarf-shrubland	G2	S1S2	221A			232Ac
IV.A.1.N.g	Saturated needle-leaved or microphyllous evergreen dwarf-shrubland	CHAMAEDAPHNE CALYCULATA SATURATED DWARF-SHRUBLAND ALLIANCE	A.1092					221Ae, 221Am	221Ba, 221Bd		232Ac
				CEGL006008	Chamaedaphne calyculata–(Gaylussacia dumosa)–Decodon verticillatus / Woodwardia virginica Dwarf-shrubland	G5	S1	221A	221B		
				CEGL006208	Chamaedaphne calyculata / Carex striata Dwarf-shrubland	G?	S2S3				232A
IV.A.1.N.g	Saturated needle-leaved or microphyllous evergreen dwarf-shrubland	VACCINIUM MACROCARPON SATURATED DWARF-SHRUBLAND ALLIANCE	A.1094					221A	221B		232A
				CEGL006141	Vaccinium macrocarpon–Morella pensylvanica Dwarf-shrubland	G2	S1S2	221A			232A
IV.A.2.N.c	Tidal needle-leaved or microphyllous evergreen dwarf-shrubland	SARCOCORNIA PERENNIS–(DISTICHLIS SPICATA, SPARTINA ALTERNIFLORA) TIDAL DWARF-SHRUBLAND ALLIANCE	A.1705					221Ae	221B	221Dc	232Ab, 232Ac
				CEGL004308	Sarcocornia perennis–Salicornia spp.–Spartina alterniflora Dwarf-shrubland	G5	S3S4	221A			232Ab, 232Ac
V.A.5.N.c	Medium-tall sod temperate or subpolar grassland	AMMOPHILA BREVILIGULATA HERBACEOUS ALLIANCE	A.1207					221A			232Ab, 232Ac

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				CEGL004043	Ammophila breviligulata–Panicum amarum Herbaceous Vegetation	G2	S1S2				232Ab, 232Ac
				CEGL006274	Ammophila breviligulata–Lathyrus japonicus Herbaceous Vegetation	G4?	S2S3	221A			232Ab
V.A.5.N.e	Short sod temperate or subpolar grassland	SPARTINA PATENS–(SCHOENOPLECTUS PUNGENS) HERBACEOUS ALLIANCE	A.1274								232Ac
				CEGL004097	Spartina patens–Schoenoplectus pungens–Solidago sempervirens Herbaceous Vegetation	G2G3	S?				232Ac
V.A.5.N.k	Seasonally flooded temperate or subpolar grassland	CALAMAGROSTIS CANADENSIS SEASONALLY FLOODED HERBACEOUS ALLIANCE	A.1400					221Ae, 221Am	221Ba, 221Bd	221Da	232Ac
				CEGL005174	Calamagrostis canadensis–Phalaris arundinacea Herbaceous Vegetation	G4G5	S?				
V.A.5.N.k	Seasonally flooded temperate or subpolar grassland	CAREX STRIATA SEASONALLY FLOODED HERBACEOUS ALLIANCE	A.1426					221A			232Ac
				CEGL004120	Carex striata var. brevis Herbaceous Vegetation	G?	S1S3				232A
V.A.5.N.k	Seasonally flooded temperate or subpolar grassland	CAREX STRICTA SEASONALLY FLOODED HERBACEOUS ALLIANCE	A.1397					221Ae, 221Am	221Ba, 221Bd	221Da, 221Dc	232A
				CEGL004121	Carex stricta Seasonally Flooded Herbaceous Vegetation [Placeholder]	G?	S3S4				232A
				CEGL006412	(Myrica gale) / Carex stricta Seasonally Flooded Herbaceous Vegetation	G?	S?				232A
V.A.5.N.k	Seasonally flooded temperate or subpolar grassland	CLADIUM MARISCOIDES SEASONALLY FLOODED HERBACEOUS ALLIANCE	A.1368					221A			232Ac
				CEGL006222	Cladium mariscoides–Danthonia sericea–Lophiola aurea Herbaceous Vegetation	G2	S1S2				232A
				CEGL006332	Cladium mariscoides–Coelorachis rugosa Herbaceous Vegetation	G1	S1				232Ab
V.A.5.N.k	Seasonally flooded temperate or subpolar grassland	JUNCUS DICHOTOMUS SEASONALLY FLOODED HERBACEOUS ALLIANCE	A.1427								
				CEGL004111	Juncus dichotomus–Drosera intermedia Herbaceous Vegetation	G?	S?				
V.A.5.N.k	Seasonally flooded temperate or subpolar grassland	PANICUM HEMITOMON SEASONALLY FLOODED TEMPERATE HERBACEOUS ALLIANCE	A.1379								232A
				CEGL006338	Panicum hemitomon–Panicum verrucosum Herbaceous Vegetation	G?	S1S2				232A
V.A.5.N.k	Seasonally flooded temperate or subpolar grassland	PANICUM VIRGATUM SEASONALLY FLOODED HERBACEOUS ALLIANCE	A.1362								232A
				CEGL004129	Panicum virgatum–Spartina patens Herbaceous Vegetation	G?	S?				232A

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V.A.5.N.k	Seasonally flooded temperate or subpolar grassland	RHYNCHOSPORA SPP.–PANICUM (RIGIDULUM, VERRUCOSUM)–RHEXIA VIRGINICA SEASONALLY FLOODED HERBACEOUS ALLIANCE	A.1384					221Ae	221Ba		232Ac
				CEGL006264	Rhexia virginica–Panicum verrucosum Herbaceous Vegetation	G2G3	S1S3	221A			232Ac
V.A.5.N.k	Seasonally flooded temperate or subpolar grassland	SCIRPUS CYPERINUS SEASONALLY FLOODED HERBACEOUS ALLIANCE	A.1386								
				CEGL006349	Scirpus cyperinus Seasonally Flooded Herbaceous Vegetation	G?	S?				
V.A.5.N.k	Seasonally flooded temperate or subpolar grassland	SPARTINA PATENS SEASONALLY FLOODED HERBACEOUS ALLIANCE	A.1390					221A			232A
				CEGL006342	Spartina patens–Eleocharis parvula Herbaceous Vegetation	G?	S1S2	221A			232A
V.A.5.N.l	Semipermanently flooded temperate or subpolar grassland	SCHOENOPLECTUS ACUTUS–(SCHOENOPLECTUS TABERNAEMONTANI) SEzMIPERMANENTLY FLOODED HERBACEOUS ALLIANCE	A.1443					221Ae	221Ba	221D	232A
				CEGL006275	Schoenoplectus (tabernaemontani, acutus) Eastern Herbaceous Vegetation	G?	S2S4	221	221	221	232
				CEGL006358	Schoenoplectus acutus–Carex lasiocarpa Herbaceous Vegetation	G1G2	S1S2	221Ae	221Ba		
V.A.5.N.l	Semipermanently flooded temperate or subpolar grassland	TYPHA (ANGUSTIFOLIA, LATIFOLIA)–(SCHOENOPLECTUS SPP) SEMIPERMANENTLY FLOODED HERBACEOUS ALLIANCE	A.1436					221Ae, 221Am	221Ba, 221Bd	221Da, 221Dc	232Ac
				CEGL006153	Typha (angustifolia, latifolia)–(Schoenoplectus spp.) Eastern Herbaceous Vegetation	G5	S5	221	221	221	
V.A.5.N.m	Saturated temperate or subpolar grassland	CLADIUM MARISCOIDES SATURATED HERBACEOUS ALLIANCE	A.1447					221A		221D	232A
				CEGL006310	Cladium mariscoides–Drosera intermedia–Eleocharis rostellata Herbaceous Vegetation	G1	S?	221A			232A
V.A.5.N.m	Saturated temperate or subpolar grassland	DESCHAMPSIA CAESPITOSA SATURATED HERBACEOUS ALLIANCE	A.1456						221Bd		
				CEGL006101	Deschampsia caespitosa–Symplocarpus foetidus Herbaceous Vegetation	G1	S1		221Bd		
V.A.5.N.n	Tidal temperate or subpolar grassland	PANICUM VIRGATUM TIDAL HERBACEOUS ALLIANCE	A.1476					221Ae			232Ac
				CEGL006150	Panicum virgatum–Carex silicea Herbaceous Vegetation	G?	S2S3	221A			232A
V.A.5.N.n	Tidal temperate or subpolar grassland	SCHOENOPLECTUS PUNGENS TIDAL HERBACEOUS ALLIANCE	A.1478					221A			232A
				CEGL004188	Schoenoplectus pungens Tidal Herbaceous Vegetation	G?	S1S3	221A			
V.A.5.N.n	Tidal temperate or subpolar grassland	SPARTINA ALTERNIFLORA TIDAL HERBACEOUS ALLIANCE	A.1471					221Ae		221Dc	232Ac

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				CEGL004192	Spartina alterniflora / (Ascophyllum nodosum) Acadian/Virginian Zone Herbaceous Vegetation	G5	S5	221A			232Ac
				CEGL004193	Spartina alterniflora–Lilaeopsis chinensis Herbaceous Vegetation	G?	S3	221A			232Ac
V.A.5.N.n	Tidal temperate or subpolar grassland	SPARTINA CYNOSUROIDES TIDAL HERBACEOUS ALLIANCE	A.1480					221A			232A
				CEGL004195	Spartina cynosuroides Herbaceous Vegetation	G4	S3	221A			232A
V.A.5.N.n	Tidal temperate or subpolar grassland	SPARTINA PATENS–(DISTICHLIS SPICATA) TIDAL HERBACEOUS ALLIANCE	A.1481					221Ae		221Dc	232Ac
				CEGL006006	Spartina patens–Distichlis spicata–Plantago maritima Herbaceous Vegetation	G5	S5	221A			232Ac
V.A.5.N.n	Tidal temperate or subpolar grassland	TYPHA (ANGUSTIFOLIA, DOMINGENSIS) TIDAL HERBACEOUS ALLIANCE	A.1472					221Ae	221Ba	221Da, 221Dc	232Ac
				CEGL004201	Typha angustifolia–Hibiscus moscheutos Herbaceous Vegetation	G?	S4				232Ac
V.A.5.N.n	Tidal temperate or subpolar grassland	ZIZANIA AQUATICA TIDAL HERBACEOUS ALLIANCE	A.1484					221Ae	221Ba		232Ac
				CEGL004202	Zizania aquatica Tidal Herbaceous Vegetation	G4?	S2S3	221A			232A
V.A.6.N.q	Bedrock temperate or subpolar grassland with a sparse tree layer	(JUNIPERUS VIRGINIANA) / SCHIZACHYRIUM SCOPARIUM–(BOUTELOUA CURTIPENDULA) WOODED HERBACEOUS ALLIANCE	A.1919					221A			
				CEGL006047	Juniperus virginiana / Bouteloua curtipendula–Carex eburnea Wooded Herbaceous Vegetation	G1G2	S1	221A			
V.A.7.N.g	Medium-tall temperate or subpolar grassland with a sparse cold-deciduous shrub layer	SCHIZACHYRIUM LITTORALE SHRUB HERBACEOUS ALLIANCE	A.1533					221A			232A
				CEGL004240	Morella pensylvanica / Schizachyrium littorale–Eupatorium hyssopifolium Shrub Herbaceous Vegetation	G2	S2?				232A
V.A.7.N.p	Saturated temperate or subpolar grassland with a sparse cold-deciduous shrub layer	CALAMOVILFA BREVIPILIS SATURATED SHRUB HERBACEOUS ALLIANCE	A.3007								232Ab, 232Ac
				CEGL006397	Gaylussacia dumosa / Calamovilfa brevipilis Shrub Herbaceous Vegetation	G1	S1				232Ab, 232Ac
V.A.7.N.p	Saturated temperate or subpolar grassland with a sparse cold-deciduous shrub layer	CAREX (FLAVA, HYSTERICINA, INTERIOR, STERILIS) SATURATED SHRUB HERBACEOUS ALLIANCE	A.1561					221A	221Ba		
				CEGL006103	Morella pensylvanica–Dasiphora fruticosa ssp. floribunda / Carex sterilis–Carex flava Shrub Herbaceous Vegetation	G2	S2		221B		
				CEGL006356	Dasiphora fruticosa ssp. floribunda / Rhynchospora capillacea–Scleria verticillata Shrub Herbaceous Vegetation	G1	S1		221Ba		
				CEGL006357	Juniperus virginiana / Dasiphora fruticosa ssp. floribunda / Carex flava–Carex tetanica Shrub Herbaceous Vegetation	G1G2	S1S2		221Ba		

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				CEGL006367	Juniperus virginiana / Betula pumila / Carex sterilis–Oligoneuron rigidum Shrub Herbaceous Vegetation	G1Q	S1		221Ba		
V.A.7.N.p	Saturated temperate or subpolar grassland with a sparse cold-deciduous shrub layer	MYRICA GALE / CAREX LASIOCARPA SATURATED SHRUB HERBACEOUS ALLIANCE	A.1563					221A	221B		
				CEGL006068	Myrica gale–Dasiphora fruticosa ssp. floribunda / Carex lasiocarpa–Cladium mariscoides Shrub Herbaceous Vegetation	G2G3	S1	221A	221B		
V.B.2.N.e	Semipermanently flooded temperate perennial forb vegetation	PONTEDERIA CORDATA–PELTANDRA VIRGINICA SEMIPERMANENTLY FLOODED HERBACEOUS ALLIANCE	A.1669					221Ae	221Ba	221D	232Ac
				CEGL007696	Peltandra virginica–Saururus cernuus–Carex crinita / Climacium americanum Herbaceous Vegetation	G2?	S?				
V.B.2.N.g	Tidal temperate perennial forb vegetation	AMARANTHUS CANNABINUS TIDAL HERBACEOUS ALLIANCE	A.1706					221Ae	221Ba	221Da, 221Dc	232Ac
				CEGL006080	Amaranthus cannabinus Tidal Herbaceous Vegetation	G3G5	S2S3	221A	221B		232Ac
V.B.2.N.g	Tidal temperate perennial forb vegetation	ERIOCAULON PARKERI TIDAL HERBACEOUS ALLIANCE	A.1701					221Ae	221Ba		232Ac
				CEGL006352	Eriocaulon parkeri–Polygonum punctatum Herbaceous Vegetation	G2	S2?	221A			
V.B.2.N.g	Tidal temperate perennial forb vegetation	NUPHAR LUTEA TIDAL HERBACEOUS ALLIANCE	A.1708					221A			232Ac
				CEGL004472	Nuphar lutea ssp. advena Tidal Herbaceous Vegetation	G?	S2S3				232Ac
V.B.2.N.g	Tidal temperate perennial forb vegetation	PELTANDRA VIRGINICA–PONTEDERIA CORDATA TIDAL HERBACEOUS ALLIANCE	A.1703					221A	221B	221D	232Ab, 232Ac
				CEGL004706	Peltandra virginica–Pontederia cordata Tidal Herbaceous Vegetation	G3G4	S?				232Ab, 232Ac
				CEGL006325	Mixed Forbs High Marsh Tidal Herbaceous Vegetation [Placeholder]	G?	S3	221A	221B	221D	232Ac
V.B.2.N.g	Tidal temperate perennial forb vegetation	SAGITTARIA SUBULATA–LIMOSELLA AUSTRALIS TIDAL HERBACEOUS ALLIANCE	A.1710					221A			232Ab, 232Ac
				CEGL004473	Sagittaria subulata–Limosella australis Tidal Herbaceous Vegetation	G?	S1S3	221A			232A
V.C.2.N.a	Permanently flooded temperate or subpolar hydromorphic rooted vegetation	NYMPHAEA ODORATA–NUPHAR SPP. PERMANENTLY FLOODED TEMPERATE HERBACEOUS ALLIANCE	A.1984					221A	221B		232Ac
				CEGL002386	Nuphar lutea ssp. advena–Nymphaea odorata Herbaceous Vegetation	G4G5	S4	221	221	221	
				CEGL006086	Nymphaea odorata–Eleocharis robbinsii Herbaceous Vegetation	G2	S1S2	221A	221B		232Ac
V.C.2.N.a	Permanently flooded temperate or subpolar hydromorphic rooted vegetation	PODOSTEMUM CERATOPHYLLUM PERMANENTLY FLOODED HERBACEOUS ALLIANCE	A.1752								

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				CEGL004331	Podostemum ceratophyllum Herbaceous Vegetation	G5	S?				
V.C.2.N.a	Permanently flooded temperate or subpolar hydromorphic rooted vegetation	VALLISNERIA AMERICANA PERMANENTLY FLOODED TEMPERATE HERBACEOUS ALLIANCE	A.1757								
				CEGL006196	Vallisneria americana–Potamogeton perfoliatus Herbaceous Vegetation	G5	S4	221	221	221	232
V.C.2.N.b	Permanently flooded-tidal temperate or subpolar hydromorphic rooted vegetation	RUPPIA MARITIMA PERMANENTLY FLOODED–TIDAL TEMPERATE HERBACEOUS ALLIANCE	A.1769					221A	221B		232Ac
				CEGL006167	Ruppia maritima Acadian/Virginian Zone Temperate Herbaceous Vegetation	G?	S3S4	221A	221B		232Ac
V.C.2.N.b	Permanently flooded-tidal temperate or subpolar hydromorphic rooted vegetation	STUCKENIA PECTINATA–ZANNICHELLIA PALUSTRIS PERMANENTLY FLOODED–TIDAL HERBACEOUS ALLIANCE	A.1768					221A	221B		232A
				CEGL006027	Stuckenia pectinata–Zannichellia palustris–(Ruppia maritima) Permanently Flooded–Tidal Herbaceous Vegetation	G3G5	S2S3	221A	221B		232A
V.C.2.N.b	Permanently flooded-tidal temperate or subpolar hydromorphic rooted vegetation	ZOSTERA MARINA PERMANENTLY FLOODED–TIDAL HERBACEOUS ALLIANCE	A.1766					221A	221B		232A
				CEGL004336	Zostera marina Herbaceous Vegetation [Placeholder]	G?	S3	221A	221B		232A
VII.C.2.N.a	Sand flats	CAKILE EDENTULA SPARSE VEGETATION ALLIANCE	A.1861					221A			232Ac
				CEGL004400	Cakile edentula ssp. edentula–Chamaesyce polygonifolia Sparse Vegetation	G4G5	S1S2	221A			232Ac
VII.C.4.N.d	Tidal mud flats	ISOETES RIPARIA TIDAL SPARSE VEGETATION ALLIANCE	A.1879					221A			232A
				CEGL006058	Isoetes riparia Tidal Sparse Vegetation	G?	S2S3	221A			232A