

THE VEGETATION OF CONNECTICUT A PRELIMINARY CLASSIFICATION



By Kenneth J. Metzler & Juliana P. Barrett



State Geological and Natural History Survey of Connecticut



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CONNECTICUT DEPARTMENT OF
ENVIRONMENTAL PROTECTION

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*State Geological & Natural History Survey of Connecticut
Department of Environmental Protection
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Dedication



Antoni W.H. Damman (1932-2000)

This work is dedicated to the memory of Dr. Antoni W.H. Damman, (1932-2000) who both challenged and inspired ecologists, botanists, and students as a colleague, teacher, mentor, and friend. Ton worked tirelessly on vegetation classification for both Connecticut and other parts of northeastern North America. He was truly an inspiration to many vegetation ecologists throughout the world.

Without his enthusiasm, encouragement, and attention to detail, this report would never have reached completion. All of us associated with the description and classification of vegetation will miss him greatly.

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TABLE OF CONTENTS

ACKNOWLEDGEMENTS iv

GENERAL ECOLOGICAL DESCRIPTION OF CONNECTICUT 1

HISTORY AND DEVELOPMENT OF THE CLASSIFICATION 5

FORESTS 7

EVERGREEN FORESTS 8

DECIDUOUS FORESTS 11

WOODLANDS 21

EVERGREEN WOODLANDS 22

DECIDUOUS WOODLANDS 24

MIXED EVERGREEN-DECIDUOUS WOODLANDS 26

SHRUBLANDS 29

DECIDUOUS SHRUBLANDS 30

DWARF-SHRUBLANDS 35

EVERGREEN DWARF-SHRUBLANDS 36

DECIDUOUS DWARF-SHRUBLANDS 38

HERBACEOUS VEGETATION 39

GRAMINOID VEGETATION 40

HERBACEOUS FORB VEGETATION 51

HYDROMORPHIC ROOTED VEGETATION 56

SPARSE VEGETATION 59

CONSOLIDATED ROCK SPARSE VEGETATION 60

BOULDER, GRAVEL, COBBLE, OR TALUS SPARSE VEGETATION 60

UNCONSOLIDATED MATERIAL SPARSE VEGETATION 60

GLOSSARY 63

BIBLIOGRAPHY 69

LIST OF FIGURES AND APPENDICES

FIGURES

FIGURE 1. U.S. FOREST SERVICE ECOREGION SUBSECTIONS OF CONNECTICUT 1

FIGURE 2. MAJOR GEOLOGICAL LANDSCAPES OF CONNECTICUT 2

APPENDICES 75

APPENDIX I. INDEX OF THE VEGETATION CLASSIFICATION 77

APPENDIX II. CONNECTICUT VEGETATION ORGANIZED BY NATURAL
COMMUNITY TYPES 85

APPENDIX III. SOIL DRAINAGE AND SOIL MOISTURE CLASSES 95

APPENDIX IV. TYPICAL TOPOSEQUENCES OF MAJOR VEGETATION TYPES. 97

GENERAL ECOLOGICAL DESCRIPTION OF CONNECTICUT

Connecticut is an ecologically diverse state, even though it is densely populated and covers only 5,090 square miles. Despite its small geographic size, Connecticut has considerable variation in geology, soils, and climate. This variation, in addition to the influence of man, has had a strong influence on the present ecological condition of the state. Located on the Atlantic Seaboard between New York and Boston, Connecticut has a long history of European settlement. Land clearing for agriculture, impoundments for hydropower and irrigation, clear cuts for charcoal production, and, more recently, commercial and residential development has markedly changed the pre-settlement appearance of the land.

Based on this physical and ecological variation, Connecticut has been subdivided into eleven climatic bio-geographical units called ecoregions (Dowhan and Craig 1976). Each ecoregion was distinguished by a combination of biological and physical attributes that separated it from the others. The purpose of this delineation was to describe the distribution of species, particularly rare species, and their relationship to the physical attributes of the state. However, in areas with moderate relief such as Connecticut, climatic gradients are gentle and vegetation changes are very gradual over long distances. Here, the effects of surficial material, local

relief, and major drainage features are much more important than climate in the determination of the differences in vegetation from site to site (Damman 1979). In this respect, we feel that the ecoregions of Dowhan and Craig do not definitively depict distinct areas with major vegetation differences. Rather, these ecoregions accentuate the broad transition in vegetation response to climate on a gradient of distance from the coast. For the delineation of the major vegetation provinces in Connecticut that have developed in response to significant differences in climate, we prefer a regional perspective (Bailey 1976, Keys et al., 1995, Figure 1). Within these regional units, local landscape patterns and processes are the most important factors in predicting and understanding the pattern of vegetation from site to site.

Geology

The geology and topography of Connecticut show considerable variation. Natural processes of many kinds have contributed to its present structure. During the Pleistocene Epoch, the Wisconsin glacier covered the entire area. When the ice melted approximately 15,000 years ago, part of its rock debris was left in place as glacial till, and part was carried by glacial meltwater and deposited as stratified beds of sand, gravel, silt, and clay in the valleys and lowlands. Although changes in the topography

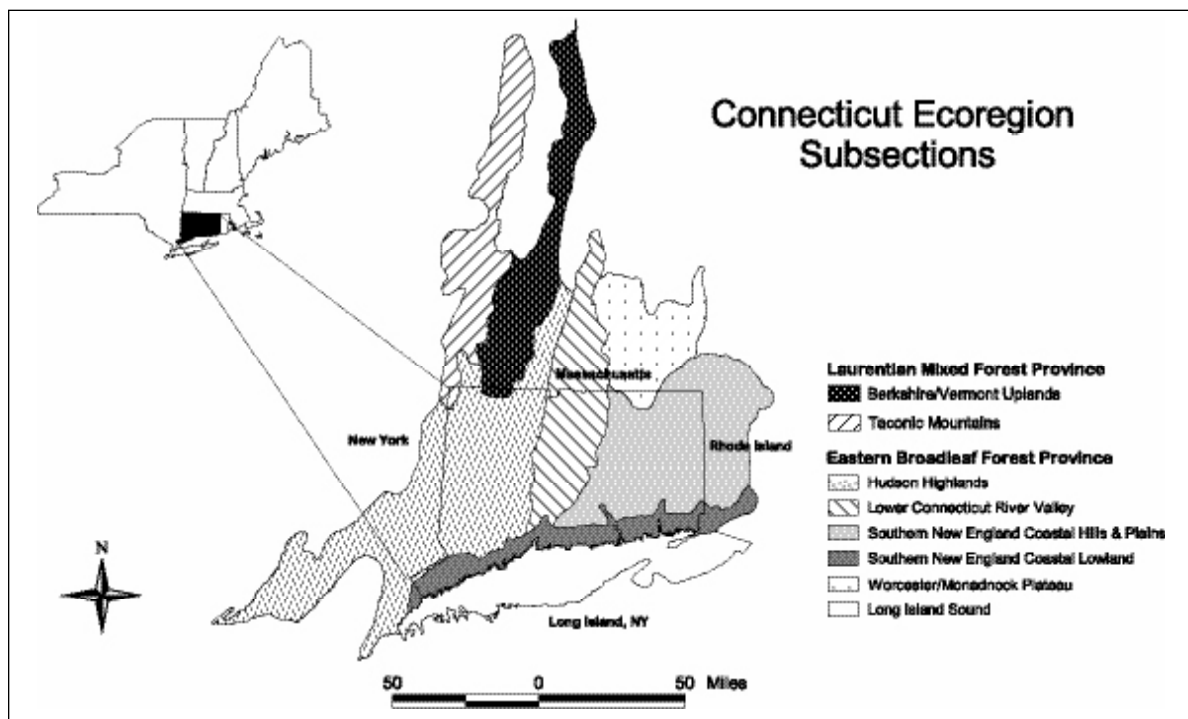


Figure 1. U.S. Forest Service Subsections (Keys et al., 1995)

of the upland areas were relatively small, the vast meltwater deposits made the valleys much flatter. In general, the depth of unconsolidated materials on the upland is much less than 10 feet, whereas the depth of valley deposits may exceed 100 feet (Flint 1930).

Geologically, Connecticut is in the New England Upland Province (Thornbury 1965), subdivided into several geologic landscapes as illustrated in Figure 2. The bedrock of the eastern and western part of the state is chiefly crystalline gneisses and schist of the Paleozoic Era that were complexly folded into north-trending belts. On the western border of the state, several north-trending valleys underlain primarily by marble of Paleozoic age occur. In contrast to the eastern and western areas, the bedrock geology of the Central Valley is considerably younger, composed primarily of sedimentary and igneous rocks of the Triassic/Jurassic age. These rocks occur in alternating layers tilted to the east, with erosion-resistant basalts forming an almost continuous north trending ridge.

Soils

The soils of Connecticut are relatively youthful, of Wisconsinan age or more recent, and have formed mostly under a hardwood forest of oak, hickory, birch, and maple (Hill et al., 1980). These soils can be organized into five natural groups: 1) soils formed in glacial till, 2) soils formed in coarse textured strat-

ified drift, 3) soils formed in glacial lake sediments, 4) soils formed in floodplains, and 5) organic soils in undrained basins and depressions.

Soils derived from glacial till predominate in the eastern and western portions of the state. These soils are generally rocky and have little organic-matter accumulation in the upper layers. Till soils can be further subdivided as occurring over deep and moderately deep friable to firm glacial till, over dense till (“hardpan”), and over shallow till. In the Eastern and Western Hills, till soils are derived primarily from crystalline rocks (gneiss and schist); in the Central Valley, the till soils are derived from red sandstones, shale, and basalts; and in the Marble Valleys from the underlying limestone bedrock.

Soils formed on stratified drift occur primarily on the broader reaches of large valleys. In most places, a few inches to three feet of loamy or fine sandy material cover the older, coarser deposits. Most of these soils are deep and rapidly permeable. Soils of stratified drift are common in the Central Valley and along the larger rivers and streams in the Eastern and Western Hills.

Soils formed on glacial lake sediments occur primarily in the Central Valley. These soils have a high content of clay and silt, but in some areas the fine-grained lake sediments are covered by several

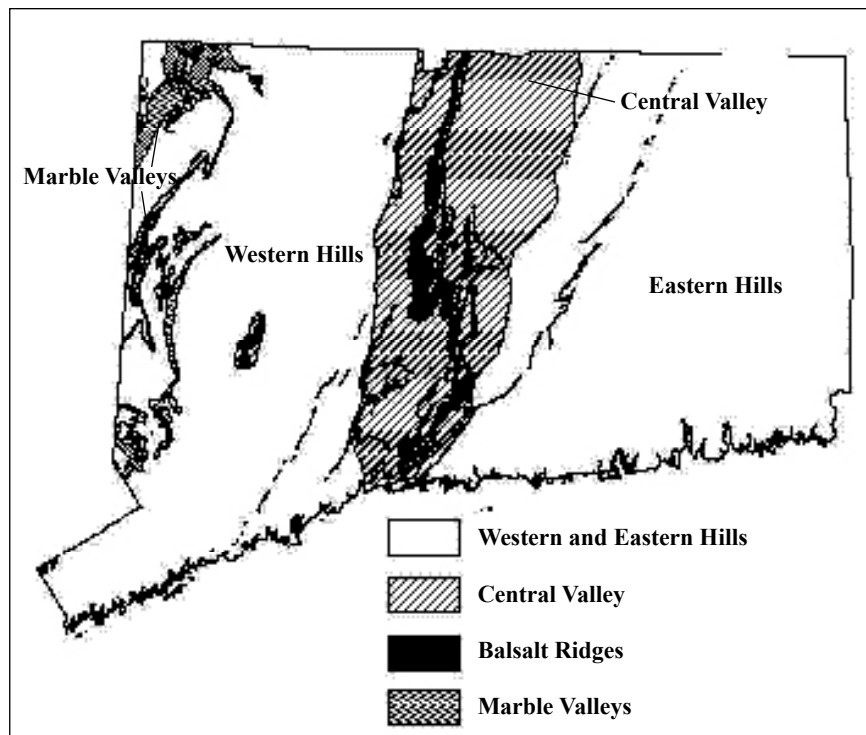


Figure 2. Major Geological Landscapes of Connecticut

inches to a few feet of coarser loamy or sandy material. Water percolates slowly through the silts and clays and most of these soils have a seasonal high zone of saturation.

Floodplain soils occur along gently graded rivers and streams. They have formed in loamy or sandy deposits several inches to a few feet thick that overlay layers of sand and gravel. These soils are subject to seasonal inundation, with the lower, more poorly drained soils flooded more frequently. In some areas, surface ponding and/or flooding can occur during most of the growing season. Floodplain soils are widespread along major rivers such as the Connecticut and Farmington and are found as narrow bands along smaller rivers and streams throughout the state.

Organic soils occur in depressions and basins where surface peats and mucks accumulate. These soils vary from 1 ½ to more than 5 feet deep, are saturated most of the time, and often have surface water throughout the winter and spring. Wind throws commonly occur and result in an irregular microtopography of hummocks and depressions. Organic soils are common throughout Connecticut.

Climate

The climate of Connecticut is best characterized by its changeability. Located in the belt of the prevailing westerly winds, the climate is influenced by air from the interior of the North American continent. Most precipitation, however, comes from warm, moist maritime air swept up from the Caribbean Sea. Connecticut is close to the storm track set off by the interplay of these two air systems, and the resulting weather has great variations from day to day, season to season, and year to year.

In general, Connecticut's climate has large ranges in both diurnal and annual temperature, ample precipitation usually uniformly distributed throughout the year, variation between the same season in different years, and considerable diversity from place to place (Brumbach 1965). Climatic extremes frequently occur, and include hurricanes, excessive precipitation and droughts of one or more years' duration, severe ice storms, and tornadoes.

Vegetation

A glimpse of the pre-European-settlement vegetation of Connecticut can be gained from Bromley (1935) and Westveld (1956). According to these descriptions, Connecticut at that time was almost entirely forested, with the exception of pitch-pine woodlands and bear-oak thickets on excessively

drained sites. Forests in southern and central Connecticut were dominated by mixtures of oaks, American chestnut, hickories, and eastern hemlock; increasingly mixed with eastern white pine to the north and to the east. The northwestern corner, as today, was transitional to forests of American beech, birch, and maple. From the time of European settlement until the late 1800s, these forests were largely cleared, plowed, and grazed, first for subsistence agriculture and later for the production of charcoal. With the demise of agriculture on marginal lands, much of the forest cover has returned, with approximately 70% of the state now vegetated with second growth (stump-sprout) trees and successional forests. Nearly all of Connecticut would revert to forest if active management practices were abandoned.

Forests

The geographic and climatic location of Connecticut places the state almost entirely within the Appalachian Oak Forest Section of the Eastern Broadleaf Forest Province (Keys et al., 1993). A prominent forest cover of tall, broadleaf trees - primarily oak, beech, birch, maple and hickory - which provide a continuous and dense canopy in the summer but shed their leaves completely in the winter, characterizes this section. Major tree dominants on "typical" well-drained soils of this section in Connecticut include oaks, beech, birch and hickories. Eastern hemlock and eastern white pine are also common or even locally abundant or dominant. Red maple, ash and American elm tend to dominate forested wetlands and drainageways. American chestnut was a dominant forest tree in Connecticut until the 1920s, when it was nearly exterminated by the chestnut blight. Currently, eastern hemlock is experiencing a similar decline due to an infestation of hemlock woolly adelgid.

In northwestern Connecticut, these forests grade into the Northern Hardwoods Forest Section of the Laurentian Mixed Forest Province (Keys et al., 1993). Here, the winters are moderately longer and more severe than in the rest of the state, with a resultant shorter frost-free season. Northern hardwoods such as sugar maple, beech, and yellow birch along with eastern white pine and eastern hemlock replace the dominance of oaks on typical well drained sites. Although forested wetlands are still often dominated by red maple, conifers such as eastern hemlock and red spruce are conspicuous.

Woodlands

In Connecticut, woodlands are a relatively uncommon vegetation type found scattered along the coast,

on many talus slopes, in wetland forest-shrubland transitions, and as part of a mosaic with herbaceous vegetation on excessively well-drained soils. Here, salt spray, substrate availability, flooding, or drought limits tree density and height. Oaks, red maple, green ash, black spruce, eastern red cedar, and/or pitch pine form an open canopy over a variety of shrubs and herbaceous plants.

Shrublands

Shrublands occur on both upland and wetland sites. On uplands, these are primarily abandoned agricultural lands that are reverting to forest, but in some instances, pure shrub thickets may persist for years. Most shrublands will revert to forest over time. On excessively drained rocky summits, shrub complexes of eastern red cedar, pitch pine, bear oak, and little bluestem are common. In wetland areas, shrub thickets can be more persistent, with some naturally occurring communities found in areas too wet to support trees. These include common button-bush-dominated kettles and depressions, ericaceous thickets, and alder or willow borders along streams and lakes. Other natural shrublands occur in seepage fens and other calcareous wetlands in the marble valleys of northwest Connecticut. Here, shrubby cinquefoil, bog birch, several willows and sweet gale are characteristic.

Dwarf-shrublands

Dwarf-shrublands are scattered throughout Connecticut in bogs formed in deep kettles and undrained bedrock depressions, on stable sand dunes, and on exposed ridgetops. Bogs are generally composed of a mosaic of concentric rings of different plant communities grading from open water to forested swamps or upland communities. In Connecticut, bogs tend to be quite acidic and are influenced by water containing dissolved minerals from the adjoining uplands. Sphagnum and other mosses form a continuous mat covered by a dense growth of dwarf ericaceous shrubs. Leatherleaf is generally dominant, with small, scattered black spruce, tamarack, and red maple trees.

Dwarf-shrublands on coastal dunes are dominated by beach heather, a community type that is quite rare in Connecticut. Kinnikinnick-dominated dwarf-shrublands are equally rare, occurring on a small number of traprock summits in central Connecticut.

Herbaceous Vegetation

Most herbaceous vegetation in Connecticut is a product of man-induced disturbance, with fire, mowing, grazing, and flooding the primary agents. However, natural herbaceous vegetation occurs in extremely droughty sites associated with active sand dunes, along rivers and streams that experience excessive erosion and sedimentation, in tidally flooded areas, and in areas too wet to support woody plants. Sand barren grasslands dominated by little bluestem are frequent in sandy deposits throughout the state, whereas beach grass is predominant along the coast. Tidally flooded marshes also occur naturally along the coast and in the lower reaches of large tidal rivers. Freshwater marshes and wet meadows occur throughout the state where grazing, mowing and/or flooding exclude trees. If disturbance was eliminated from these sites, many would eventually revert to forest. Natural freshwater marshes can be found in permanently flooded depressions, shallow ponds, and on the margins of shallow lakes. Here, numerous grasses, sedges, rushes, and herbaceous forbs persist. In deeper waters, a hydromorphic rooted herbaceous vegetation of waterlilies, pondweeds, milfoils, and others replace emergent plants. Due to the lack of ecological information, hydromorphic rooted vegetation is not fully described in this report.

Sparse Vegetation

Sparse vegetation occurs on bedrock outcrops, cliff faces, open talus, open sands, and highly disturbed sites. Nonvascular plants such as lichens and mosses can be conspicuous. Little information exists on Connecticut's sparse vegetation, and therefore it is not fully described in this report.

HISTORY AND DEVELOPMENT OF THE CLASSIFICATION

This classification and description of the vegetation types that occur within the State of Connecticut is a snapshot of the evolutionary thinking of numerous ecologists. Initiated by the observations of Dr. George E. Nichols, the vegetative patterns and floristic assemblages were described (Nichols 1913, 1914a, 1914b, 1915, 1916, 1920) as having distinct patterns arranged by differences in geographic and edaphic factors. Although many of Nichols' observations are quite similar to those observed today, there have been substantive differences in land-use patterns, land-use history, and population trends. Two changes in particular are the dramatic shift from an agrarian landscape to forest, and the major change in forest composition due to the demise of the American chestnut in the 1920s and 1930s caused by the infestation of chestnut blight. These, coupled with the ease of mobility created by automobiles and the nearly continuous road network throughout the state, have allowed the study of areas nearly inaccessible during Nichols' day.

After this initial work, there was little Connecticut activity in plant ecology until the 1960s, when the vegetative patterns of several State Natural Areas were described (Egler and Niering 1965, 1967, 1971, 1976; Niering and Egler 1966; Niering and Goodwin 1962). These reports stimulated a renewed focus on Connecticut's vegetation, with regional patterns as reflected by landforms and climate described and mapped by Dowhan and Craig (1976). Also during this time, The Nature Conservancy (TNC), in partnership with faculty from various universities, sponsored internships to collect biological information on several of their preserves, providing detailed vegetation descriptions and maps.

The next stage in the development of this classification was the influence of Dr. Antoni W.H. Damman. Trained in the vegetation-sampling methods of Braun-Blanquet (Mueller-Dombois and Ellenberg 1974) Damman taught many students these techniques and had a major influence on both the development of this classification and the development of a national classification for the United States. Simultaneously, the State Geological and Natural History Survey of Connecticut, staffed by several of his students, including the senior author, focused on systematic data collection of various habitats throughout the state. These observations, as well as those of Damman and several of his other students, have been drawn on heavily in this work (Barrett 1989, 1994, Damman and French 1987, Damman and Kershner 1977, Kershner 1975, Messier 1980,

Metzler and Damman 1985, Metzler and Rozsa 1982, Metzler and Tiner 1992, Perry 1987, 1989, Rozsa and Dowhan 1977).

Concurrently, the work of TNC on both a regional and national level has had the final influence on this current work. Initiated by the attempt to develop a regional natural community classification (Rawinski 1984), the effort of TNC and numerous state Natural Heritage Program ecologists to coordinate each state classification into a regional framework was unparalleled. Culminating in the publication of *International Classification of Ecological Communities: Terrestrial Vegetation of the United States, Volumes I & II* (Anderson et al., 1998; Grossman et al., 1998), the initial work of this partnership evolved from a habitat-based classification of regional landscapes to a floristic-based national classification of vegetation organized into a physiognomic framework. Currently, the partnership between TNC and the state Natural Heritage Programs is an organization called NatureServe. NatureServe and the Ecological Society of America are working to develop national vegetation standards (Jennings et al., 2003) and the upper physiognomic levels of the classification have been adopted as federal standards (FGDC 1997). This framework provides the basic organization for this report.

Following this framework, Connecticut's vegetation types have been organized into a hierarchical structure reflecting both a "top-down" and "bottom-up" approach. The upper levels of the hierarchy reflect the basic structure of the vegetation (forest, woodland, shrubland, dwarf-shrubland, herbaceous, sparse vegetation), leaf phenology (deciduous, evergreen, mixed) or life form (graminoid, forb, etc.), and leaf type (broadleaf, needle-leaf, etc.). These are further subdivided by other variables such as location within broad climatic zones, relative landscape position, hydrologic regime, or additional physiognomic characteristics. The lower levels, in contrast, are based on the floristic composition of the vegetation. An assessment and emphasis on dominant and/or characteristic species determine these levels.

The identification and description of the vegetation types listed in this report are based on a variety of sources, including field observations and descriptions from Connecticut and adjacent states, as well as analyzed field data. When analyzed, we used either tabular comparison (Mueller-Dombois and Ellenberg 1974) or one of several analytical programs

available in the PC-ORD version 3.20 Multivariate Analysis package (McCune and Mefford 1997). In instances, the inclusion of vegetation types was based solely on their descriptions in some unpublished works.

As presented, this classification closely mirrors the TNC national vegetation classification (Anderson et al., 1998, Grossman et al., 1998), diverging in several important ways. First, many of the associations included in the “mixed evergreen-deciduous forest” and “mixed evergreen-deciduous woodlands” subclasses of the TNC classification were largely ignored. We made this decision due to difficulties in distinguishing associations solely by canopy coverage, since in Connecticut, the woody canopy within an association often varies by geographic location and by its local land-use history.

Second, all herbaceous groups with a sparse woody layer (sparse tree, sparse shrub, sparse dwarf-shrub) were similarly ignored. All associations within these groups were included within the corresponding herbaceous associations (mostly grasslands) with their descriptions reflecting the variations that can occur due to reasons similar to those discussed above.

Third, there is no separation of annual and perennial herbaceous subclasses in this classification. This decision was made because of the difficulty in recognizing associations due to the regular mixing of annual and perennial species within most herbaceous associations and the difficulty in distinguishing the life-form strategy of each associated plant.

Fourth, there was a compression of many short, medium-tall, and tall herbaceous subclasses for similar reasons.

Fifth, there are no descriptions of alliances in this classification. Without an analysis of data collected in an area larger than the geographic confines of the State of Connecticut, it is felt that the use of

alliances other than as convenient placeholders is premature. In this respect, this classification can be most appropriately viewed as a listing and description of associations that, at this time, occur and are thought to occur in Connecticut. As additional data are collected, the paradigm presented in this work may and probably will change.

We hope that this classification and description of the vegetation types that occur within Connecticut will stimulate the next stage of plant ecology activity within the state: a stage of increased systematic data collection, data analyses, and geographic placement of associations within the context of a national vegetation classification. We would appreciate any comments, criticisms, and field data on plant associations in order to improve and expand this classification.

The nomenclature used in this report follows the USDA Plants Database (2005) for Latin names of vascular plants. The names of mosses, liverworts, and lichens follow the USDA Plants Database (2005), Missouri Botanical Garden W3 MOST (2005), or Crum and Anderson (1981). Colloquial names of vascular plants follow either the USDA Plants Database (2005) or Dowhan (1979). Format for the nomenclature of the vegetation types follows Anderson et al. (1998) with hyphens representing no change in stratum; e.g., tree - tree, shrub - shrub, herb - herb and slashes representing change from one stratum to another; e.g., tree / shrub, tree / herb, etc.

When examples of a specific vegetation type are given, these areas are either state, municipally, or tribally owned or are conservation lands maintained by several non-profit organizations, particularly The Nature Conservancy. Before visiting these sites, please contact the appropriate organization to ensure that no restrictions apply.

FORESTS



FORESTS

(Trees with their crowns overlapping, generally forming 60-100% cover)

EVERGREEN FORESTS

(Evergreen species generally contribute more than 75% of the total tree cover)

Eastern hemlock (*Tsuga canadensis*) forests

This forest-cover type occurs on dry to moist hillsides and in ravines. Often occurring on sites similar to those dominated by deciduous trees, the distribution of eastern hemlock (*Tsuga canadensis*) forests is a function of former land use history and protection from fire. Eastern hemlock forests can also occur as a linear feature, confined to steep slopes or in protected ravines or as patches throughout the upland landscape. These forests rarely occur as “pure” stands, and are often mixed with eastern white pine (*Pinus strobus*), oaks, maple, birch, and other trees, largely dependent on site conditions. Shrub and herbaceous cover is generally sparse. Throughout much of the state, scattered shrubs include flowering mapleleaf viburnum (*Viburnum acerifolium*), American witch hazel (*Hamamelis virginiana*), mountain laurel (*Kalmia latifolia*), lowbush blueberries (*Vaccinium* spp.), and others. Common herbs include wild sarsaparilla (*Aralia nudicaulis*), partridgeberry (*Mitchella repens*), starflower (*Trientalis borealis*), Indian pipe (*Monotropa uniflora*), and Canada mayflower (*Maianthemum canadense*).

In northwestern Connecticut and in other areas where northern hardwoods predominate, eastern hemlock (*Tsuga canadensis*) is intermixed with sugar maple (*Acer saccharum*), yellow birch (*Betula allegheniensis*), and American beech (*Fagus grandifolia*), with a sparse shrub and herbaceous layer. Recently, eastern hemlock (*Tsuga canadensis*) forests have been significantly impacted by the spread of the hemlock woolly adelgid, with many stands dying or in decline, particularly in southern and central Connecticut.

Eastern hemlock forests are treated as a cover type in this classification (*facies* in the Zürich-Montpellier tradition), therefore, no communities are defined.

Extent in Connecticut — throughout, rare in southeastern Connecticut

Examples — Tunxis State Forest, Housatonic State Forest, and other public lands in northwest Connecticut; other State Forests have examples of eastern hemlock forests in various stages of hemlock woolly adelgid infestation

Basis for description — Damman and Kershner (1977), field observations

NatureServe cross-reference — *Pinus strobus* – *Tsuga canadensis* Lower New England/Northern Piedmont Forest (CEGL006328), *Tsuga canadensis* – *Betula alleghaniensis* Lower New England/Northern Piedmont Forest (CEGL006109), *Tsuga canadensis* – *Fagus grandifolia* – *Quercus rubra* Forest (CEGL006088)

Eastern hemlock (*Tsuga canadensis*) seasonally flooded forests

This community may fill all or part of upland valleys where nutrient-level inputs are moderate to very low and relatively high water levels are maintained throughout the summer. The soil is developed in organic mucks saturated with water even during prolonged dry periods. Surface water is generally present in hollows and depressions well into the growing season. Eastern hemlock (*Tsuga canadensis*) is the dominant tree species and often forms dense stands through which little light penetrates. Other tree species include yellow birch (*Betula alleghaniensis*), red maple (*Acer rubrum*) and occasional trees of eastern white pine (*Pinus strobus*). This community is characterized by an irregular topography of mounds and depressions caused by tree uprooting. The shrub layer is poorly developed due to shading by the tree canopy. Shrub species that do occur include northern spicebush (*Lindera benzoin*), winterberry (*Ilex verticillata*), highbush blueberry (*Vaccinium corymbosum*), common mountain holly (*Nemopanthus mucronata*), and mountain laurel (*Kalmia latifolia*). The presence of various herb species depends on the moisture tolerance of each species. Herbs that often occur include cinnamon fern and royal fern (*Osmunda cinnamomea*, *O. regalis*), threeleaf goldthread (*Coptis trifolia*) and in wetter areas that receive seepage, sensitive fern (*Onoclea sensibilis*), skunk cabbage (*Symplocarpus foetidus*), and jack-in-the-pulpit (*Arisaema triphyllum*). Bryophytes are conspicuous and include *Sphagnum* spp. and *Bazzania trilobata*.

Extent in Connecticut — throughout, although best expressed in Litchfield County

Example — Wyantenock State Forest, Cornwall

Basis for description — Messier (1980), field descriptions

NatureServe cross-reference — *Tsuga canadensis* – *Betula alleghaniensis* / *Ilex verticillata* / *Sphagnum* spp. Forest (CEGL006226), *Tsuga canadensis* – *Acer rubrum* – *Betula alleghaniensis* / *Osmunda cinnamomea* Forest (CEGL006380)

Atlantic white cedar (*Chamaecyparis thyoides*) seasonally flooded forests

Atlantic white cedar / Great laurel (*Chamaecyparis thyoides* / *Rhododendron maximum*) community

This community typically occurs in basin swamps overlying stratified drift, glacio-lacustrine deposits and till. In this forest community, Atlantic white cedar (*Chamaecyparis thyoides*) dominates the tree canopy. Other tree species that may occur include red maple (*Acer rubrum*), eastern hemlock (*Tsuga canadensis*), yellow birch (*Betula alleghaniensis*) and sometimes blackgum (*Nyssa sylvatica*). The tall shrub layer is dominated by great laurel (*Rhododendron maximum*). This community type is characterized by a poorly developed herbaceous layer due to the closed canopy allowing only low levels of light to penetrate to the forest floor. Mosses that may occur here include *Sphagnum* spp., *Bazzania trilobata*, and *Thuidium delicatulum*. Cedar reproduction seems to be very poor in this community.

Extent in Connecticut — southeastern Connecticut

Examples — Rhododendron Sanctuary Natural Area Preserve, Pachaug State Forest, Voluntown

Basis for description — Barrett (1998), Metzler (1997), Sperduto and Crowley (2002), field descriptions

NatureServe cross-reference — *Chamaecyparis thyoides* / *Rhododendron maximum* Forest (CEGL006355)

Atlantic white cedar – Red maple – Yellow birch (*Chamaecyparis thyoides* – *Acer rubrum* – *Betula alleghaniensis*) community

This forest community occurs under variable habitat conditions, most commonly in seasonally saturated basins. Several occurrences for this community type occur on seasonally flooded streambanks. While Atlantic white cedar (*Chamaecyparis thyoides*) is dominant, tree species that are always

found in significant quantity are red maple (*Acer rubrum*), yellow birch (*Betula alleghaniensis*), and eastern hemlock (*Tsuga canadensis*). The shrub layer is often well developed and very diverse. Common winterberry (*Ilex verticillata*), coastal sweet pepperbush (*Clethra alnifolia*), and highbush blueberry (*Vaccinium corymbosum*) often occur here, with maleberry (*Lyonia ligustrina*), mountain laurel (*Kalmia latifolia*), smooth winterberry (*Ilex laevigata*), and swamp doghobble (*Leucothoë racemosa*) occurring sporadically. The herbaceous layer is highly variable depending on the amount of light penetration through the tree and shrub layers. Commonly occurring species include: cinnamon fern (*Osmunda cinnamomea*), skunk cabbage (*Symplocarpus foetidus*), Canada mayflower (*Maianthemum canadense*), threeleaf goldthread (*Coptis trifolia*), eastern teaberry (*Gaultheria procumbens*), starflower (*Trientalis borealis*), eastern marsh fern (*Thelypteris palustris*) and three-seeded sedge (*Carex trisperma*). Under poorer light conditions, mountain laurel (*Kalmia latifolia*) and eastern hemlock (*Tsuga canadensis*) become more dominant in the shrub layer, and ferns and mosses become more common (bog fern (*Thelypteris simulata*), eastern marsh fern (*Thelypteris palustris*), *Sphagnum* spp., *Bazzania trilobata*, and *Thuidium delicatulum*). Cedar reproduction is poor in this community.

Extent in Connecticut — eastern Connecticut

Example — Chester Cedar Swamp National Natural Landmark, Cockaponset State Forest, Chester

Basis for description — Barrett (1998), Metzler (1997), Sperduto and Crowley (2002), field descriptions

NatureServe cross-reference — *Chamaecyparis thyoides* – (*Tsuga canadensis* – *Betula alleghaniensis*) / *Clethra alnifolia* Forest (CEGL006189)

Atlantic white cedar / Swamp azalea (*Chamaecyparis thyoides* / *Rhododendron viscosum*) community

This community typically occurs in semipermanently to seasonally flooded streamside or lakeshore habitats with high water levels and without extreme fluctuations in water level. Atlantic white cedar (*Chamaecyparis thyoides*) typically forms a dense, almost monospecific canopy, with red maple (*Acer rubrum*) and yellow birch (*Betula alleghaniensis*) occurring infrequently and sporadically. Shrubs typically include sweet pepperbush (*Clethra alnifolia*), common mountain holly (*Nemopanthus mucronatus*), highbush blueberry (*Vaccinium*

corymbosum), swamp azalea (*Rhododendron viscosum*), blue huckleberry (*Gaylussacia frondosa*), and glossy buckthorn (*Frangula alnus*). The herbaceous layer is very variable, with starflower (*Trientalis borealis*), threeseeded sedge (*Carex trisperma*), regal fern (*Osmunda regalis*), Virginia marsh St. Johnswort (*Triadenum virginicum*), and marsh fern (*Thelypteris palustris*) commonly found. Common mosses include *Sphagnum palustre* and other species of *Sphagnum*, *Thuidium* spp., *Pallavicinia lyellii*, and *Dicranium* spp.

Extent in Connecticut — eastern Connecticut

Example — Lower Pond, Thompson (Wyndam Land Trust)

Basis for description — Barrett (1998), Laderman (1989), Metzler (1997), Motzkin (1991), Sperduto and Crowley (2002), field descriptions

NatureServe cross-reference — *Chamaecypris thyoides* – *Acer rubrum* / *Lycopus* spp. Forest (CEGL006364)

Northern white cedar (*Thuja occidentalis*) seasonally flooded forests

These swamp forests are rare in Connecticut, described from a single occurrence on poorly drained, calcium-rich soils with seasonal flooding. Northern white cedar (*Thuja occidentalis*) occurs either as nearly pure stands or is mixed with other trees including red maple (*Acer rubrum*), eastern hemlock (*Tsuga canadensis*), eastern white pine (*Pinus strobus*), yellow birch (*Betula alleghaniensis*), black ash (*Fraxinus nigra*), and occasionally larch (*Larix laricina*). The shrub layer is sparse, and includes American hornbeam (*Carpinus caroliniana*), mountain laurel (*Kalmia latifolia*), black ash (*Fraxinus nigra*) and elms (*Ulmus americana* and *U. rubra*). Herbaceous species are diverse. Skunk cabbage (*Symplocarpus foetidus*) is common. Sedge species include *Carex interior*, *C. leptalea*, *C. stipata* and *C. stricta*. Other herbaceous species may include marsh blue violet (*Viola cucullata*), wild sarsaparilla (*Aralia nudicaulis*), marsh marigold (*Caltha palustris*), goldthread (*Coptis trifolia*), yellow lady's slipper (*Cypripedium parviflorum*), foamflower (*Tiarella cordifolia*), two-leaved miterwort (*Mitella diphylla*), naked miterwort (*Mitella nuda*), and starflower (*Trientalis borealis*). In open areas, hairy sedge (*Carex lacustris*) may dominate. Many other herbaceous species occur with low cover throughout

this swamp community. Moss cover is variable, and includes species such as *Bazzania trilobata*, *Thuidium delicatulum*, *Dicranum scoparium*, *Hylocomium splendens*, and *Trichocolea tomentella*.

Extent in Connecticut — western marble valleys

Example — Robbins Swamp Natural Area Preserve, Canaan

Basis for description — Reschke (1990), Sawyer (1998), field descriptions

NatureServe cross-reference — *Thuja occidentalis* / *Sphagnum (girgensohnii, warnstorffii)* Forest (CEGL006007)

Red spruce (*Picea rubens*) saturated forests

Red spruce / Common mountain holly (*Picea rubens* / *Nemopanthus mucronata*) community

This community occurs in wet depressions in the colder parts of northwestern Connecticut where the substrate is regularly inundated. The soil is peaty and very poorly drained. This bog forest is dominated by red spruce (*Picea rubens*), but eastern hemlock (*Tsuga canadensis*), red maple (*Acer rubrum*), and yellow birch (*Betula alleghaniensis*) may also occur. Tree cover is variable, dependent on blowdowns from storm events and the age of the stand. Shrub cover is patchy, often dense, with common mountain holly (*Nemopanthus mucronata*), mountain laurel (*Kalmia latifolia*), highbush blueberry (*Vaccinium corymbosum*), and common winterberry (*Ilex verticillata*). Herb cover is uniform, particularly below openings in the canopy, and may include cinnamon fern (*Osmunda cinnamomea*), threeseeded sedge (*Carex trisperma*), blueberry species (*Vaccinium* spp.), creeping snowberry (*Gaultheria hispidula*), bluebead (*Clintonia borealis*), and threelobed goldthread (*Coptis trifolia*). Mosses cover much of the ground, with species such as *Sphagnum* spp. and *Bazzania trilobata* dominant.

Extent in Connecticut — northwestern Connecticut

Example — Holleran Swamp, Colebrook (TNC)

Basis for description — field observations, field descriptions

NatureServe cross-reference — *Picea rubens* - *Acer rubrum* / *Nemopanthus mucronata* Forest (CEGL006198)

FORESTS

Black spruce (*Picea mariana*) saturated forests

Black spruce / Sheep laurel (*Picea mariana* / *Kalmia angustifolia*) community

This bog forest is known from a single occurrence in northwestern Connecticut. Occurring in a bedrock depression, the accumulated peats have created a habitat suitable for the development of a dense forest dominated by black spruce (*Picea mariana*), eastern white pine (*Pinus strobus*), and tamarack (*Larix laricina*). The shrub cover is dense, but small openings occur throughout. Common shrubs include common mountain holly (*Nemopanthus mucronata*), highbush blueberry (*Vaccinium corymbosum*), and young black spruce. Low shrub and herbaceous cover is patchy, occurring particularly in openings, and may include sheep laurel (*Kalmia angustifolia*), leatherleaf (*Chamaedaphne calyculata*), cranberry (*Vaccinium macrocarpon*), purple pitcher plant (*Sarracenia purpurea*), roundleaf sundew (*Drosera rotundifolia*), white beaksedge (*Rhynchospora alba*), and threeseeded sedge (*Carex trisperma*). Mosses cover much of the ground and are dominated by a number of *Sphagnum* species and liverworts such as *Bazzania trilobata*.

Extent in Connecticut — northwestern Connecticut

Example — Mohawk Mountain Black Spruce Bog Natural Area Preserve, Cornwall

Basis for description — Messier (1980), field observations

NatureServe cross-reference — *Picea mariana* / (*Vaccinium corymbosum*, *Gaylussacia baccata*) / *Sphagnum* sp. Forest (CEGL006098)

DECIDUOUS FORESTS

(Deciduous tree species generally contribute more than 75% of the total tree cover; includes some mixed evergreen/deciduous forest types)

Sugar maple – American beech – Yellow birch (*Acer saccharum* - *Fagus grandifolia* - *Betula alleghaniensis*) forests

Sugar maple – American beech / Hobblebush (*Acer saccharum* - *Fagus grandifolia* / *Viburnum lantanoides*) community

This forest community is found along gentle, rocky lower slopes often with numerous boulders. Tree-

species composition includes American beech (*Fagus grandifolia*), sugar maple (*Acer saccharum*), eastern hemlock (*Tsuga canadensis*) and yellow birch (*Betula alleghaniensis*). White ash (*Fraxinus americana*) may also occur. A dominant shrub cover occurs and includes American beech (*Fagus grandifolia*), hobblebush (*Viburnum lantanoides*), and striped maple (*Acer pensylvanicum*). American beech (*Fagus grandifolia*) also occurs as seedlings and root sprouts in the herb layer. Herb plants are scattered, with species including small hobblebush shrubs (*Viburnum lantanoides*), intermediate woodfern (*Dryopteris intermedia*), and marginal woodfern (*Dryopteris marginalis*). Other herbaceous species include shining clubmoss (*Huperzia lucidula*), partridgeberry (*Mitchella repens*), wild sarsaparilla (*Aralia nudicaulis*), Canada yew (*Taxus canadensis*), red trillium (*Trillium erectum*), whorled wood aster (*Oclemea acuminatus*), mountain woodsorrel (*Oxalis montana*), bluebead (*Clintonia borealis*) and Indian cucumber (*Medeola virginiana*).

Extent in Connecticut — northwestern Connecticut

Example — Algonquin State Forest, Colebrook

Basis for description — Smith (1992), field descriptions

NatureServe cross-reference — *Acer saccharum* – *Betula allegheniensis* - *Fagus grandifolia* / *Viburnum lantanoides* Forest (CEGL006252), *Tsuga canadensis* - *Fagus grandifolia* Forest (CEGL006088), *Tsuga canadensis* – *Betula allegheniensis* Forest (CEGL006109)

Sugar maple – American beech /Intermediate woodfern (*Acer saccharum* - *Fagus grandifolia* / *Dryopteris intermedia*) community

This forest community is found along gentle to moderately steep, stony slopes. Boulders cover much of the surface and are often moss covered. Tree species composition is predominately yellow birch (*Betula alleghaniensis*), with some eastern hemlock (*Tsuga canadensis*) and sugar maple (*Acer saccharum*). The high shrub layer, composed of striped maple (*Acer pensylvanicum*), is sparse, whereas the more prevalent low shrubs such as mountain maple (*Acer spicatum*), striped maple (*Acer pensylvanicum*), and hobblebush (*Viburnum lantanoides*) are common. Scattered red elderberry (*Sambucus racemosa* var. *racemosa*) is occasionally found. Herb layer coverage is moderate, with

intermediate woodfern (*Dryopteris intermedia*) dominant. Other ground layer plants include Canada yew (*Taxus canadensis*), shining clubmoss (*Huperzia lucidula*) and seedlings of mountain maple (*Acer spicatum*).

Extent in Connecticut — northwestern Connecticut

Example — Algonquin State Forest, Colebrook

Basis for description — Smith (1992), field descriptions

NatureServe cross-reference — *Acer saccharum* - *Betula allegheniensis* - *Fagus grandifolia* / *Viburnum lantanoides* Forest (CEGL006252)

Sugar maple – White ash – American basswood (*Acer saccharum* – *Fraxinus americana* - *Tilia americana*) forests

Sugar maple – White ash / Blue cohosh (*Acer saccharum* - *Fraxinus americana* / *Caulophyllum thalictroides*) community

This community occurs on nutrient rich, moist lower slopes. In addition to sugar maple (*Acer saccharum*) and white ash (*Fraxinus americana*), characteristic tree species include yellow birch (*Betula alleghaniensis*), American basswood (*Tilia americana*), hop hornbeam (*Ostrya virginiana*), butternut (*Juglans cinerea*) and scattered red oak (*Quercus rubra*). American bladdernut (*Staphylea trifolia*) can be a dominant shrub, and red elderberry (*Sambucus racemosa* var. *racemosa*) and roundleaf dogwood (*Cornus rugosa*) are characteristic. The herbaceous layer is predominant, including blue cohosh (*Caulophyllum thalictroides*), Canadian wild ginger (*Asarum canadense*), bloodroot (*Sanguinaria canadensis*), Dutchman’s-breeches (*Dicentra cucullaria*), rue anemone (*Thalictrum pubescens*), and burr reed sedge (*Carex sparganioides*). Various fern species frequently occur.

Extent in Connecticut — rich, moist slopes throughout the state, uncommon in eastern Connecticut

Examples — Talcott Mountain State Park, Simsbury/Bloomfield, Canaan Mountain Natural Area Preserve, Canaan/North Canaan

Basis for description — Damman and Kershner (1977), Rozsa and Dowhan (1977), field descriptions

NatureServe cross-reference — *Acer saccharum* - *Fraxinus americana* - *Tilia americana* / *Acer spicatum* / *Allium tricoccum* - *Caulophyllum thalictroides* Forest (CEGL005008)

Sugar maple – White ash / Silver false spleenwort (*Acer saccharum* - *Fraxinus americana* / *Deparia acrostichoides*) community

This community develops on the lower portion of rich, rocky slopes, generally below cliffs or ledges. Humus accumulates within crevices of the rocks and boulders, providing a rooting substrate. White ash (*Fraxinus americana*) and sugar maple (*Acer saccharum*) are dominant trees, with bitternut hickory (*Carya cordiformis*) and slippery elm (*Ulmus rubra*) also commonly occurring. The shrub cover often includes northern spicebush (*Lindera benzoin*), American witch hazel (*Hamamelis virginiana*) and American bladdernut (*Staphylea trifolia*). Herbaceous cover is high and includes many fern species (*Deparia acrostichoides*, *Adiantum pedatum*, *Onoclea sensibilis*, *Osmunda claytoniana*). Other herbaceous species include many species of wet soils that optimally grow in swamps or floodplains: e.g., rough bedstraw (*Galium asprellum*), false hellebore (*Veratrum viride*), Virginia waterleaf (*Hydrophyllum virginiana*), crinkleroot (*Cardamine diphylla*), and Canadian woodnettle (*Laportea canadensis*). Showy orchid (*Galearis spectabilis*), Clayton’s sweetroot (*Osmorhiza claytonii*), and other rich-woods herbs also occur in this community. In some occurrences, particularly in northwestern Connecticut, additional characteristic herbaceous species include Canada violet (*Viola canadensis*) and squirrel corn (*Dicentra canadensis*).

Extent in Connecticut — rich, bouldery slopes throughout the state, uncommon in eastern Connecticut

Example — Algonquin State Forest, Colebrook

Basis for description — Damman and Kershner (1977), field descriptions

NatureServe cross-reference — *Acer saccharum* - *Fraxinus americana* - *Tilia americana* / *Acer spicatum* / *Allium tricoccum* - *Caulophyllum thalictroides* Forest (CEGL005008)

Sugar maple – White ash / New York fern (*Acer saccharum* - *Fraxinus americana* / *Thelypteris noveboracensis*) community

This community is the most nutrient poor and driest of the sugar maple - white ash forests, occurring on streamsides, drainageways, and wetland borders. Sugar maple (*Acer saccharum*) and white ash (*Fraxinus americana*) are the dominant tree species, with admixtures of oaks (*Quercus rubra*, *Q. velutina*) and birches (*Betula lenta* and *B. allegheniensis*). Shrub cover is generally sparse, with American witch hazel (*Hamamelis virginiana*) and spicebush (*Lindera benzoin*) the most common. Herbaceous cover is generally dense, with New York fern (*Thelypteris noveboracensis*) most abundant. Other herbs may include nightcaps (*Anemone quinquefolia*), fragrant bedstraw (*Galium triflorum*), and interrupted fern (*Osmunda claytoniana*).

Extent in Connecticut — throughout Connecticut

Example — Pond Mountain Natural Area, Kent (Pond Mountain Trust)

Basis for description — Damman and Kershner (1977), field descriptions

NatureServe cross-reference — *Acer saccharum* - (*Fraxinus americana*) / *Arisaema triphyllum* Forest (CEGL006211)

Sugar maple – Oak (*Acer saccharum* – *Quercus* spp.) forests

Sugar maple – White ash / Roundlobe hepatica (*Acer saccharum* - *Fraxinus americana* / *Hepatica nobilis* var. *obtusata*) community

This community occurs on very rocky slopes that are well drained to moist. White ash (*Fraxinus americana*) and sugar maple (*Acer saccharum*) are common in the tree canopy. Oaks, e.g., northern red oak (*Quercus rubra*), hickories (*Carya* spp.), and sometimes American beech (*Fagus grandifolia*) are present in the tree layer. The shrub layer includes American witch hazel (*Hamamelis virginiana*) and northern spicebush, (*Lindera benzoin*) with hop hornbeam (*Ostrya virginiana*) present on drier sites. Herbaceous cover includes differential species such as broadleaf sedge (*Carex platyphylla*), early meadow rue (*Thalictrum dioicum*), roundlobe hepatica (*Hepatica nobilis* var. *obtusata*) and rue anemone (*Thalictrum thalictroides*). Other common herbs include nodding fescue (*Festuca subverticillata*), Christmas fern (*Polystichum acrostichoides*), white baneberry (*Actaea pachypoda*), common blue violet (*Viola sororia*), rock-cress (*Arabis* spp.), roundleaf ragwort (*Packera obovata*), and jack-in-the-pulpit (*Arisaema triphyllum*). This community may be

differentiated from the other sugar maple – white ash communities by the occurrence of broadleaf sedge (*Carex platyphylla*), early meadow rue (*Thalictrum dioicum*), roundlobe hepatica (*Hepatica nobilis* var. *obtusata*), rue anemone (*Anemonella thalictroides*) and perhaps longstalk sedge (*Carex pedunculata*).

Extent in Connecticut — most frequent on rich, dry slopes in western Connecticut, occasional on basalt ridges and other rocky slopes

Examples — Canaan Mountain Natural Area Preserve, Canaan/North Canaan; Talcott Mountain State Park, Bloomfield/Simsbury

Basis for description — Damman and Kershner (1977), field descriptions

NatureServe cross-reference — *Acer saccharum* - *Quercus rubra* / *Hepatica nobilis* var. *obtusata* Forest (CEGL006046)

Sugar maple – Chinkapin oak / Bristleleaf sedge (*Acer saccharum* - *Quercus muehlenbergii* / *Carex eburnea*) community

This forest occurs on upper slopes and summits of limestone or marble ridges. Dominant tree species include sugar maple (*Acer saccharum*), chinkapin oak (*Quercus muehlenbergii*), American basswood (*Tilia americana*), and white ash (*Fraxinus americana*), with occasional hickories (*Carya ovata*, *C. ovalis*). These forests are relatively open, with a variable subcanopy of hop hornbeam (*Ostrya virginiana*), American witch hazel (*Hamamelis virginiana*), common hackberry (*Celtis occidentalis*) and alternate-leaved dogwood (*Cornus alternifolia*). The herbaceous layer can be quite diverse, with numerous species such as roundleaf ragwort (*Packera obovata*), bristleleaf sedge (*Carex eburnea*), Seneca snakeroot (*Polygala senega*), red columbine (*Aquilegia canadensis*), smooth yellow foxglove (*Aureolaria flava*), blackseed rice (*Piptatherum racemosum*), thimbleweed (*Anemone virginiana*), roundlobe hepatica (*Hepatica nobilis* var. *obtusata*), asters (*Aster patens*, *A. undulatus*), orange fruit horse gentian (*Triosteum aurentiacum*), early meadow-rue (*Thalictrum dioicum*), western blue virginsbower (*Clematis occidentalis*), and many others. Bedrock outcrops and boulders are common, with numerous bryophytes covering the exposed rock.

Extent in Connecticut — northwest marble valleys

Example — no examples with public access

Basis for description — field descriptions

NatureServe cross-reference — *Acer saccharum* - *Quercus muehlenbergii* / *Carex platyphylla* Forest (CEGL006162)

Pignut hickory – White ash (*Carya glabra* - *Fraxinus americana*) forests

These forest communities occur on dry, rocky summits of either acidic or circumneutral soils. Dominant tree species include hickories (*Carya glabra*, *C. ovalis*, *C. ovata*) and white ash (*Fraxinus americana*), with occasional oaks (*Quercus* spp.), hop hornbeam (*Ostrya virginiana*), and sugar maple (*Acer saccharum*). Tree height is low in stature, and the sporadic shrub layer — combined with an herbaceous layer often dominated by grasses and sedges (*Carex pensylvanica* often dominant) — gives these forests a characteristic parklike appearance. In some occurrences, a patchy to nearly continuous shrub layer of downy arrowwood (*Viburnum rafinesquianum*) is characteristic. Additional herbs include Canada bluegrass (*Poa compressa*), little bluestem (*Schizachyrium scoparium*), tick trefoils (*Desmodium* spp.), whorled milkweed (*Asclepias verticillata*), rock-cress (*Arabis* spp.), roughleaf ricegrass (*Oryzopsis asperifolia*) and a variety of ferns, such as ebony spleenwort (*Asplenium platyneuron*) and woodsia (*Woodsia obtusa*). Spring ephemerals are also characteristic, and include early saxifrage (*Saxifraga virginensis*), Virginia spring beauty (*Claytonia virginica*), common blue violet (*Viola sororia*) and dogtooth violet (*Erythronium americanum*).

Extent in Connecticut — traprock ridges, conical summits and upper slopes in western Connecticut

Examples — Kitchel Wilderness Area Natural Area Preserve, Colebrook; Hubbard Park, Meriden

Basis for description — Damman and Kerschner (1977), Rozsa and Dowhan (1977), field descriptions

NatureServe cross-reference — *Quercus rubra* - *Carya (glabra, ovata)* - *Ostrya virginiana* / *Carex lecorum* Forest (CEGL006301).

Northern red oak / Flowering dogwood (*Quercus rubra* / *Cornus florida*) forests

Northern red oak / Mapleleaf viburnum (*Quercus rubra* / *Viburnum acerifolium*) community

This forest community usually occurs in deep,

moderately well to well drained soils on midslopes and on shallow soils influenced by seepage water. This community also occurs on terrace escarpments and on well drained glacial-lake sediments in the Central Valley region. Red oak (*Q. rubra*) is often the dominant tree species, but other trees often co-occur: e.g., black oak (*Q. velutina*), sweet birch (*Betula lenta*), red maple (*Acer rubrum*) and hickories (*Carya* spp.). A subcanopy of flowering dogwood (*Cornus florida*) is characteristic. The shrub layer is well developed, often dominated by mapleleaf viburnum (*Viburnum acerifolium*), beaked hazelnut (*Corylus cornuta*) and American witch hazel (*Hamamelis virginiana*). Ericaceous shrubs, while present, are sparse. The presence of other species such as sugar maple (*Acer saccharum*), flowering dogwood (*Cornus florida*), fragrant bedstraw (*Galium triflorum*) and spotted geranium (*Geranium maculatum*) reflect the greater soil fertility and moisture regime as compared with the other oak forest types. Recently, overbrowsing by white-tailed deer has significantly altered the structure of this community, with the characteristic shrub layer eliminated in many parts of the state.

Extent in Connecticut – throughout Connecticut

Examples — Spiderweed Preserve, Middletown (TNC); West Rock Ridge State Park, New Haven

Basis for description — Damman and Kerschner (1977), Rozsa and Dowhan (1977), field descriptions

NatureServe cross-reference — *Quercus (alba, rubra, velutina)* / *Cornus florida* - *Viburnum acerifolium* Forest (CEGL006336)

American beech – White oak – Northern red oak – Tuliptree (*Fagus grandifolia* - *Quercus alba* - *Quercus rubra* – *Liriodendron tulipifera*) community

This forest community is believed to occur along the Connecticut coast in southern Fairfield County. This community is described as having a mixed canopy of red oak, (*Quercus rubra*), white oak (*Quercus alba*), American beech (*Fagus grandifolia*), sugar maple (*Acer saccharum*), sweetgum (*Liquidambar styraciflua*) and tuliptree (*Liriodendron tulipifera*). The conspicuous occurrence of flowering dogwood (*Cornus florida*) is characteristic. The shrub layer is characterized most commonly by mapleleaf viburnum (*Viburnum acerifolium*). The herb layer includes feathery false lily of the valley (*Maianthemum racemosum*), starry false lily of the valley (*Maianthemum stellata*), smooth Solomon's

seal (*Polygonatum biflorum*), jack-in-the-pulpit (*Arisaema triphyllum*), spotted geranium (*Geranium maculatum*), Virginia creeper (*Parthenocissus quinquefolia*), and upland sedges such as Swan's sedge (*Carex swanii*).

Extent in Connecticut — southwestern Connecticut

Example — no examples with public access

Basis for description — NatureServe descriptions

NatureServe cross-reference — *Quercus rubra* - *Acer saccharum* - *Liriodendron tulipifera* Forest (CEGL006125)

Northern red oak - Black oak - Chestnut oak (*Quercus rubra* - *Quercus velutina* - *Quercus prinus*) forests

Black oak - Chestnut oak / Black huckleberry (*Quercus velutina* - *Q. prinus* / *Gaylussacia baccata*) community

This forest community occurs on shallow and other dry, rocky soils, usually on upper slopes and summits or on deep, excessively drained sands and gravels. In rocky or other droughty sites, the tree canopy may be open, often forming woodlands. Chestnut oak (*Quercus prinus*) is generally the dominant tree on shallow soils over bedrock, whereas other oaks, e.g., black and scarlet (*Quercus velutina*, *Q. coccinea*), are prevalent on sandy sites. White Oak (*Quercus alba*) can also be important, particularly in warmer sites along the coast. In many occurrences, pitch pine (*Pinus rigida*) or eastern white pine (*Pinus strobus*) can be an important component of the canopy. A low shrub layer of black huckleberry (*Gaylussacia baccata*) intermixed with patches of lowbush blueberries (*Vaccinium pallidum*, *V. angustifolium*), and the following drought indicator species distinguish this community from other oak forests: bastard toadflax (*Comandra umbellata*), poverty oatgrass (*Danthonia spicata*), and little bluestem (*Schizachyrium scoparium*), occurring particularly in openings. In some occurrences, mountain laurel (*Kalmia latifolia*) may also co-occur or become dominant.

In eastern and north central Connecticut on excessively acidic sites, blue huckleberry (*Gaylussacia frondosa*) is a regularly occurring shrub. In northwestern Connecticut, another variant of this community occurs, dominated nearly exclusively by northern red oak (*Quercus rubra*)

with deerberry (*Vaccinium stamineum*) a regularly occurring shrub.

Extent in Connecticut — common on dry upper slopes throughout much of Connecticut, less common in northern Litchfield and southern Fairfield counties

Examples — Pachaug State Forest, Voluntown; Canaan Mountain Natural Area Preserve, Canaan/North Canaan; Hurd State Park, East Hampton

Basis for description — Damman and Kerschner (1977), Rozsa and Dowhan (1977), field descriptions

NatureServe cross-reference — *Quercus prinus* - *Quercus (rubra, velutina)* / *Vaccinium angustifolium* Forest (CEGL006282), *Pinus rigida* - *Quercus (velutina, prinus)* Forest (CEGL006290), *Quercus prinus* - *Quercus velutina* / *Gaylussacia frondosa* Forest (CEGL006334), *Quercus rubra* - (*Quercus prinus*) / *Vaccinium* spp. / *Deschampsia flexuosa* Woodland (CEGL006134)

Northern red oak - Black oak / Blue Ridge blueberry (*Quercus rubra* - *Quercus velutina* / *Vaccinium pallidum*) community

This forest community occurs on dry to well drained soil on upper and middle slopes and summits. The soil is shallow, but in contrast to the previous community, are either deeper to bedrock or have a higher soil moisture holding capacity. Red and black oak (*Quercus rubra* and *Q. velutina*) are the dominant tree species, although chestnut oak (*Q. prinus*) and pines can commonly occur. Several variants of this community occur in Connecticut, reflecting differences in climate and substrate. In northwestern Connecticut, American beech (*Fagus grandifolia*) and red maple (*Acer rubrum*) regularly occur, along with striped maple (*Acer pensylvanicum*) and American witch hazel (*Hamamelis virginiana*). Near the coast, sassafras (*Sassafras albidum*) and coastal sweet pepperbush (*Clethra alnifolia*) are frequent. Another variant of vegetation type occurs on well drained sandy soils, often dominated by white and/or scarlet oak (*Quercus alba*, *Q. coccinea*), hickories (*Carya* spp.), and/or eastern white pine (*Pinus strobus*). This community's characteristic ground cover is either an open dwarf-shrub layer of predominantly lowbush blueberry species (*Vaccinium angustifolium* and *V. pallidum*) or a lawn of Blue Ridge sedge and/or Pennsylvania sedge (*Carex lucorum*, *C. pensylvanica*) intermixed with ericaceous dwarf-

shrubs. Mountain laurel (*Kalmia latifolia*) can be sparse to frequent. Additional herbaceous species include narrowleaf cowwheat (*Melampyrum lineare*), moccasin flower (*Cypripedium acaule*), eastern teaberry (*Gaultheria procumbens*), western brackenfern (*Pteridium aquilinum*) and rattlesnake weed (*Hieracium venosum*), and other species. Black huckleberry (*Gaylussacia baccata*) may occur sporadically throughout this community.

Extent in Connecticut — common on dry upper slopes throughout much of Connecticut, less common in northern Litchfield and southern Fairfield counties

Example — Meshomasic State Forest, Glastonbury

Basis for description — Damman and Kerschner (1977), field descriptions

NatureServe cross-reference — *Quercus coccinea* – *Quercus velutina* / *Sassafras albidum* / *Vaccinium pallidum* Forest (CEGL006375)

Northern red oak – Yellow birch (*Quercus rubra* - *Betula alleghaniensis*) forests

Northern red oak – Yellow birch / Cinnamon fern (*Quercus rubra* - *Betula alleghaniensis* / *Osmunda cinnamomea*) community

This community occurs on somewhat poorly drained mineral soil with a soil moisture regime of moist to somewhat wet. This community has a nearly continuous tree canopy, with the tree height reflecting the moisture availability of the site. Dominant tree species include red maple (*Acer rubrum*), yellow birch (*Betula alleghaniensis*), and northern red and black oak (*Quercus rubra* and *Q. velutina*). Shrub layer cover includes American witch hazel (*Hamamelis virginiana*), highbush blueberry (*Vaccinium corymbosum*), and spicebush (*Lindera benzoin*). The herbaceous layer is nearly continuous and is dominated by cinnamon fern (*Osmunda cinnamomea*), New York fern (*Thelypteris noveboracensis*) and sessileleaf bellwort (*Uvularia sessilifolia*).

Extent in Connecticut — widespread as a wetland transition throughout much of the state. Covers large areas of moist sandy soil in Hartford and New Haven counties.

Example — Mattianuck State Park, Windsor

Basis for description — Damman and Kershner

(1977), Golet et al. (1993), field descriptions

NatureServe cross-reference — *Quercus rubra* - *Betula alleghaniensis* / *Osmunda cinnamomea* Forest (CEGL006000)

Sugar maple – Bitternut hickory (*Acer saccharum* - *Carya cordiformis*) temporarily flooded forests

Sugar maple – White ash / Sprengel's sedge (*Acer saccharum* – *Fraxinus americana* / *Carex sprengelii*) community

At the upper reaches of the floodplain, a rich, diverse forest replaces the silver maple (*Acer saccharinum*) forest monoculture associated with low floodplain community types. In Connecticut, only small fragments of the high floodplain still stand, as this community type occurs on prime agricultural land. The area occupied by this community is irregularly flooded during extreme flood events and has a vegetation similar to the sugar maple / white ash / American basswood (*Acer saccharum* / *Fraxinus americana* / *Tilia americana*) forests of upland sites. Other common species of the high floodplain forest include: American elm (*Ulmus americana*), bitternut hickory (*Carya cordiformis*), American sycamore (*Platanus occidentalis*), boxelder (*Acer negundo*), American bladdernut (*Staphylea trifolia*), jumpseed (*Polygonum virginianum*), toothworts (*Cardamine diphylla*, *C. concatenata*), wild ginger (*Asarum canadense*), Dutchman's-breeches (*Dicentra cucullaria*), common moonseed (*Menispermum canadense*), Virginia waterleaf (*Hydrophyllum virginianum*), and sedges (*Carex amphibola*, *C. sprengelii*, *C. rosea*).

Extent in Connecticut — few examples remain on the high floodplain and levees along major rivers

Example — Fisher Meadows Park, Avon

Basis for description — Metzler and Damman (1985), Nichols (1920), field descriptions

NatureServe cross-reference — *Acer saccharum* - *Fraxinus* spp. - *Tilia americana* / *Matteuccia struthiopteris* - *Ageratina altissima* Forest (CEGL006114)

Silver maple – Eastern cottonwood (*Acer saccharinum* – *Populus deltoides*) temporarily flooded forests

Silver maple – Smallspike false nettle (*Acer saccharinum* / *Boehmeria cylindrica*) community

FORESTS

This community occurs on poorly drained and very poorly drained alluvial soils that are regularly flooded during freshets and storm events, even during the summer months. The soil moisture regime is wet. This forest type includes the wettest silver maple (*Acer saccharinum*) forests, frequently with ponding water long after the floodwaters recede. Silver maple is often the only tree present, although eastern cottonwood (*Populus deltoides*) and an occasional green ash (*Fraxinus pennsylvanica*) can occur. This forest is characterized by the conspicuous lack of a shrub layer and a near monoculture of low-growing nettles, e.g., smallspike false nettle (*Boehmeria cylindrica*) and Canadian clearweed (*Pilea pumila*). Other species occur throughout, including sensitive fern (*Onoclea sensibilis*), eastern poison ivy (*Toxicodendron radicans*), and white grass (*Leersia virginica*). In areas with active flood scour, white grass can be the dominant herb.

Extent in Connecticut — major rivers with active flooding

Example — Folly Brook Natural Area, Wethersfield (Great Meadows Land Trust)

Basis for description — Metzler and Damman (1985), Sperduto and Crowley (2002), field descriptions

NatureServe cross-reference — *Acer saccharinum* / *Onoclea sensibilis* - *Boehmeria cylindrica* Forest (CEGL006176)

Silver maple / Sensitive fern (*Acer saccharinum* / *Onoclea sensibilis*) community

This community occurs within the inner floodplain in areas that are above the river level and that are freely drained after floodwaters recede. Along the Connecticut River south of Cromwell, this community is the predominant floodplain type. Silver maple (*Acer saccharinum*) is the dominant tree species, with eastern cottonwood (*Populus deltoides*) occurring sporadically in the tree and shrub layers. American elm (*Ulmus americana*) and green ash (*Fraxinus pennsylvanica*) also are found as low trees. The presence of shrubs such as northern spicebush (*Lindera benzoin*), southern arrowwood (*Viburnum dentatum* var. *lucidum*), and silky dogwood (*Cornus amomum*) present a sharp contrast to the wetter silver maple forests of the inner floodplain. Typically, sensitive fern (*Onoclea sensibilis*) completely covers the forest floor. Additional species include sweet reedgrass (*Cinna*

arundinacea), white avens (*Geum canadense*), white turtlehead (*Chelone glabra*), jewelweed (*Impatiens capensis*), and several characteristic sedges (*Carex crinita*, *C. lupulina*) and *Carex grayii*, which is differential.

Extent in Connecticut — along major rivers, best expressed along the Connecticut River

Example — Wangunk Meadows Wildlife Management Area, Portland

Basis for description — Metzler and Damman (1985), Sperduto and Crowley (2002), field descriptions

NatureServe cross-reference — *Acer saccharinum* - *Ulmus americana* / *Onoclea sensibilis* Forest (CEGL006001)

Silver maple / White snakeroot (*Acer saccharinum* / *Ageratina altissima*) community

This community generally occurs on high river levees that receive active sedimentation. Silver maple (*Acer saccharinum*) is the dominant tree, with eastern cottonwood (*Populus deltoides*) and American elm (*Ulmus americana*) scattered throughout. This community is characterized by a lush ground cover and the presence of shrubs such as spicebush (*Lindera benzoin*), southern arrowwood (*Viburnum dentatum* var. *lucidum*), and silky dogwood (*Cornus amomum*). White snakeroot (*Ageratina altissima*), stinging nettle (*Urtica dioica*), Virginia creeper (*Parthenocissus quinquefolia*), great ragweed (*Ambrosia trifida*), riverbank wild rye (*Elymus riparius*) and Canada goldenrod (*Solidago canadensis*) distinguish this community from the other silver maple floodplain forest communities. In various areas, species such as woodnettle (*Laportea canadensis*), ostrich fern (*Matteuccia struthiopteris*) and eastern poison ivy (*Toxicodendron radicans*) can be the dominant ground cover.

Extent in Connecticut — high levees of major rivers

Example — Glastonbury Meadows, Glastonbury (Great Meadows Land Trust)

Basis for description — Metzler and Damman (1985), field descriptions

NatureServe cross-reference — *Acer saccharinum*

FORESTS

– (*Populus deltoides*) / *Matteuccia struthiopteris* – *Laportea canadensis* Forest (CEGL006147)

Pin oak – Green ash (*Quercus palustris* - *Fraxinus pennsylvanica*) temporarily flooded forests

These forests occur on alluvial deposits on the floodplains of small rivers that flood during local events, particularly during the winter months. Tree species include pin oak (*Quercus palustris*), green ash (*Fraxinus pennsylvanica*), swamp white oak (*Quercus bicolor*), American sycamore (*Platanus occidentalis*), red maple (*Acer rubrum*), and American elm (*Ulmus americana*). The shrub layer includes northern spicebush (*Lindera benzoin*), dogwoods (*Cornus amomum* and *C. obliqua*), southern arrowwood (*Viburnum dentatum* var. *lucidum*), and common elderberry (*Sambucus nigra* ssp. *canadensis*). The herb layer cover is nearly continuous, with sedges (*Carex crinita*, *C. lupulina*, *C. grayi*, *C. ampholola*), broadleaf enchanter's nightshade (*Circaea lutetiana* var. *canadensis*), jewelweed (*Impatiens capensis*), white avens (*Geum canadense*), sensitive fern (*Onoclea sensibilis*), lady fern (*Athyrium filix-femina*), jack-in-the-pulpit (*Arisaema triphyllum*), harlequin blue flag (*Iris versicolor*), common blue violet (*Viola sororia*), and eastern poison ivy (*Toxicodendron radicans*).

Extent in Connecticut — alluvial floodplains of small rivers

Example — Quinnipiac River State Park, North Haven/Wallingford

Basis for description — field descriptions

NatureServe cross-reference — *Quercus palustris* - *Acer rubrum* / *Carex grayi* - *Geum canadense* Forest (CEGL006185)

American sycamore – Boxelder (*Platanus occidentalis* - *Acer negundo*) temporarily flooded forests

This floodplain forest occurs on low-lying riverbanks and bars that have an active sedimentation and erosion regime. A number of trees can occur, including American sycamore (*Platanus occidentalis*), boxelder (*Acer negundo*), red maple (*Acer rubrum*), American elm (*Ulmus americana*), bitternut hickory (*Carya cordiformis*), and eastern cottonwood (*Populus deltoides*). Other than sapling trees, the only shrub regularly occurring is black willow (*Salix nigra*). The herbaceous cover is

variable, but often includes ostrich fern (*Matteuccia struthiopteris*), white avens (*Geum canadense*), sensitive fern (*Onoclea sensibilis*), and eastern poison ivy (*Toxicodendron radicans*). In many occurrences, invasive species such as creeping jenny (*Lysimachia nummularia*), dame's-rocket (*Hesperis matronalis*), and bush-honeysuckles (*Lonicera* spp.) are conspicuous.

Extent in Connecticut — mid-gradient rivers such as the Farmington and Quinnipiac rivers

Example — Nepaug State Forest (Satan's Kingdom), New Hartford

Basis for description — field descriptions

NatureServe cross-reference — *Platanus occidentalis* - *Fraxinus pennsylvanica* Forest (CEGL006036)

Red maple / Skunk cabbage (*Acer rubrum* / *Symplocarpus foetidus*) seasonally flooded forests

Red maple – Black ash / Bristly buttercup (*Acer rubrum* - *Fraxinus nigra* / *Ranunculus hispidus* var. *caricetorum*) community

This forest community occurs on nutrient-rich, poorly drained mineral soils that receive nutrient input through groundwater seepage. Primarily a wetland of calcareous soils, this community is also found on poorly drained glacial-lake sediments and other enriched sites. The tree, shrub and herb layers are well developed. The tree canopy consists primarily of red maple (*Acer rubrum*), black ash (*Fraxinus nigra*), yellow birch (*Betula alleghaniensis*), and scattered swamp oaks (*Quercus bicolor*; *Q. palustris*). Spicebush (*Lindera benzoin*), redosier dogwood (*Cornus sericea*), speckled alder (*Alnus incana* ssp. *rugosa*), poison sumac (*Toxicodendron vernix*), southern arrowwood (*Viburnum dentatum* var. *lucidum*), and willows (*Salix* spp.) are characteristic shrubs. In the herb layer, skunk cabbage (*Symplocarpus foetidus*), eastern swamp saxifrage (*Saxifraga pensylvanica*), green false hellebore (*Veratrum viride*), rue anemone (*Thalictrum pubescens*), yellow lady's slipper (*Cypripedium calceolus*), sedges (*Carex leptalea*, *C. interior*; *C. bromoides*), sensitive fern (*Onoclea sensibilis*), and others are common.

On glacial-lake soils, highbush blueberry (*Vaccinium corymbosum*), common winterberry (*Ilex verticillata*), small spike false nettle (*Boehmeria*

cylindrica), blue skullcap (*Scutellaria lateriflora*), and Canadian clearweed (*Pilea pumila*) are characteristic.

On calcareous soils, the flora is more diverse, with conifers such as northern white cedar (*Thuja occidentalis*), tamarack (*Larix laricina*), and eastern white pine (*Pinus strobus*) conspicuous in the canopy. Alderleaf buckthorn (*Rhamnus alnifolia*) is often a common shrub, and purple avens (*Geum rivale*), swamp thistle (*Cirsium muticum*), and limestone bitter cress (*Cardamine douglassii*) are characteristic herbs.

Extent in Connecticut — western marble valleys, central Connecticut

Examples — Robbins Swamp Natural Area Preserve, Canaan; Hollenbeck Preserve, Canaan (TNC); Penwood State Park, Bloomfield

Basis for description — Golet et al. (1993), Metzler and Tiner (1992), Niering and Egler (1966), Sawyer (1998), field descriptions

NatureServe cross-reference — *Fraxinus nigra* - *Acer rubrum* - (*Larix laricina*) / *Rhamnus alnifolia* Forest (CEGL006009)

Red maple / Northern spicebush (*Acer rubrum* / *Lindera benzoin*) community

This community occurs along small streams and drainageways that receive seepage water. These swamps have variable soils but are most often poorly drained tills with minimal peat accumulation. Water table fluctuations are great, with the lowlands usually flooded in the early spring. By the end of summer, the water table is often well below the surface level. Soils moisture regime is somewhat wet to wet.

Red maple (*Acer rubrum*) is the dominant tree species, with occasional black ash (*Fraxinus nigra*) and American elm (*Ulmus americana*). The shrubs include northern spicebush (*Lindera benzoin*), nannyberry (*Viburnum lentago*), winterberry (*Ilex verticillata*), red maple (*Acer rubrum*), silky dogwood (*Cornus amomum*), and sometimes coastal sweet pepperbush (*Clethra alnifolia*). The herb layer is nearly continuous, with skunk cabbage (*Symplocarpus foetidus*) and/or green false hellebore (*Veratrum viride*) dominant, particularly in the spring. Other common herbs include sensitive fern (*Onoclea sensibilis*), crested woodfern (*Dryopteris cristata*), cinnamon fern (*Osmunda cinnamomea*),

and jewelweed (*Impatiens capensis*).

Extent in Connecticut — throughout Connecticut

Examples — Salmon River State Forest, Marlborough; Shenipsit State Forest, Ellington

Basis for description — Damman and Kershner (1977), Golet et al. (1993), Messier (1980), Metzler and Tiner (1992)

NatureServe cross-reference — *Acer rubrum* - *Fraxinus (pennsylvanica, americana)* / *Lindera benzoin* / *Symplocarpus foetidus* Forest (CEGL006406)

Red maple / Highbush blueberry (*Acer rubrum* / *Vaccinium corymbosum*) seasonally flooded forests

Red maple / Common winterberry – Highbush blueberry (*Acer rubrum* / *Ilex verticillata* - *Vaccinium corymbosum*) community

These swamps form in bedrock depressions where there is a perched water table, and more commonly in flooded lowlands. In the lowlands, the water table fluctuates from above the soil surface in the early spring to below the surface toward the end of summer. The substrate is generally decomposed peat, and there is relatively low nutrient input into the system. The tree canopy is relatively open, composed almost exclusively of red maple (*Acer rubrum*), with scattered blackgum (*Nyssa sylvatica*), eastern hemlock (*Tsuga canadensis*), and/or eastern white pine (*Pinus strobus*). Shrub layer development is dependent on the density of the tree canopy, which in turn is dependent on the wetness of the site. Where there are only scattered red maples, dense shrub thickets of highbush blueberry (*Vaccinium corymbosum*), swamp azalea (*Rhododendron viscosum*), and common winterberry (*Ilex verticillata*) form. Herbaceous species composition varies and may include tussock sedge (*Carex stricta*), skunk cabbage (*Symplocarpus foetidus*), cinnamon fern (*Osmunda cinnamomea*), royal fern (*Osmunda regalis*), eastern marsh fern (*Thelypteris palustris*), sedges (*Carex intumescens*, *C. folliculata*), and occasionally seedbox (*Ludwigia palustris*) and mannagrass species (*Glyceria* spp.).

A variant of this swamp occurs on poorly drained mineral soils. Seasonal surface flooding occurs, and soil moisture is somewhat wet to wet. The tree, shrub, and herb layers are well developed. The tree layer is dominated by red maple (*Acer*

rubrum), with scattered pin oak (*Quercus palustris*) and blackgum (*Nyssa sylvatica*). The shrub layer comprises a dense thicket of sweet pepperbush (*Clethra alnifolia*), highbush blueberry (*Vaccinium corymbosum*), winterberry (*Ilex verticillata*), and swamp azalea (*Rhododendron viscosum*). Skunk cabbage (*Symplocarpus foetidus*) is a common spring herb in open areas. In both variants, blowdowns are common and tree cover is generally open, less than 75%.

Extent in Connecticut — throughout Connecticut, absent in the western marble valleys

Examples – Natchaug State Forest, Eastford; Nipmuck State Forest, Union; Pachaug State Forest, Voluntown

Basis for description — Golet et al., (1993), Metzler and Tiner (1992), Niering and Egler (1966)

NatureServe cross-reference — *Acer rubrum* / *Rhododendron viscosum* - *Clethra alnifolia* Forest, (CEGL006156), *Acer rubrum* – *Nyssa sylvatica* – *Betula alleghaniensis* / *Sphagnum* spp. Forest (CEGL006014)

Red maple – Pin oak (*Acer rubrum* - *Quercus palustris*) seasonally flooded forests

This open to partially closed forest is characterized by the conspicuous presence of swamp white oak

(*Quercus bicolor*) and/or pin oak (*Quercus palustris*) in the canopy. Associates include red maple (*Acer rubrum*), hickories (*Carya* spp.), and blackgum (*Nyssa sylvatica*). The density of the shrub layer can be variable, depending on flood duration, often containing common winterberry (*Ilex verticillata*), highbush blueberry (*Vaccinium corymbosum*), alders (*Alnus* spp.), and buttonbush (*Cephalanthus occidentalis*). The herb layer is also variable in cover, including woolgrass (*Scirpus cyperinus*), marsh fern (*Thelypteris palustris*), tussock sedge (*Carex stricta*) and other sedges (*Carex crinita*, *C. lupulina*, *C. bromoides*), fowl mannagrass (*Glyceria striata*), sensitive fern (*Onoclea sensibilis*), royal fern (*Osmunda regalis*), and cinnamon fern (*Osmunda cinnamomea*). These communities are most common on loamy sand, or clayey glacial-lake plains, in areas that are seasonally wet (winter and early spring) with a shallow, perched water table. They tend to be dry in late summer and early fall.

Extent in Connecticut — northern Central Valley

Example — Scantic River State Park, East Windsor

Basis for description — Golet et al. (1993), Metzler and Tiner (1992)

NatureServe cross-reference — *Quercus palustris* - *Acer rubrum* / *Osmunda cinnamomea* Forest (CEGL006240)



WOODLANDS

WOODLANDS

(Open stands of trees with crowns not usually touching, generally forming 25-60% cover.)

EVERGREEN WOODLANDS

(Open forest with trees over 5 meters tall forming 25-60% canopy cover. Shrubs, herbs, and nonvascular plants may be present at any cover value)

Pitch pine (*Pinus rigida*) woodlands

Pitch pine / Bear oak (*Pinus rigida* / *Quercus ilicifolia*) community

This community occurs on both bedrock summits and ledges or on deep sands where the soil moisture regime is extremely dry to very dry. A mixture of pitch pine (*Pinus rigida*) and various oaks (*Quercus* spp.) with a variable shrub layer of bear oak (*Quercus ilicifolia*) characterizes these woodlands. The herbaceous layer may include little bluestem (*Schizachyrium scoparium*), lowbush blueberry (*Vaccinium angustifolium*), narrowleaf cowwheat (*Melampyrum lineare*), poverty oatgrass (*Danthonia spicata*), goldenrods (*Solidago nemoralis*, *S. bicolor*), and bracken fern (*Pteridium aquilinum*). Mosses (*Polytrichum* spp.) and lichens (*Cladonia* spp., *Cladina* spp.) can be conspicuous.

A variant of these woodlands occurs on bedrock summits in northwestern Connecticut. In addition to a conspicuous ground cover of wavy hairgrass (*Deschampsia flexuosa*), three-toothed cinquefoil (*Sibbaldiopsis tridentata*) can be regularly found.

Extent in Connecticut — small scattered occurrences throughout, rare in Fairfield County

Example — Lantern Hill, Ledyard (Mashantucket Pequot Tribal Nation)

Basis for description — field descriptions

NatureServe cross-reference — *Pinus rigida* / (*Quercus ilicifolia*) / *Photinia melanocarpa* / *Deschampsia flexuosa* Woodland (CEGL006116), *Pinus rigida* / *Quercus ilicifolia* / *Lespedeza capitata* Woodland (CEGL006025)

Pitch pine / Lowbush blueberry (*Pinus rigida* / *Vaccinium angustifolium*) community

This woodland community can be best described as a pitch pine heath on nutrient-poor, dry sandy soils. The tree canopy is variable in cover, ranging from open woodlands to a nearly closed forest. In some occurrences, this community is nearly indistinguishable from pitch pine woodlands as described above. In addition to pitch pine (*Pinus rigida*), a number of oaks (*Quercus velutina* and *Q. coccinea*), gray birch (*Betula populifolia*), and eastern white pine (*Pinus strobus*) may occur and/or become dominant with post oak (*Quercus stellata*) an irregular component in coastal sites. The ground cover can be dominated by dwarf-shrubs, e.g., black huckleberry (*Gaylussacia baccata*) and lowbush blueberries (*Vaccinium pallidum*, *V. angustifolia*) or can be patchy with open areas of sand or grasses. Characteristic herbaceous species include little bluestem (*Schizachyrium scoparium*), poverty oatgrass (*Danthonia spicata*), Pennsylvania sedge (*Carex pensylvanica*), pinweeds (*Lechea* spp.), frostweeds (*Helianthemum canadense*, *H. bicknellii*), and others. Mosses (*Polytrichum commune*, *P. piliferum*, *P. juniperinum*) and lichens (*Cladonia* spp., *Cladina* spp.) can be conspicuous.

Extent in Connecticut — Central Valley and other areas with extensive sandy deposits

Example — Wharton Brook State Park, Wallingford

Basis for description — field observations

NatureServe cross-references — *Pinus rigida* - *Vaccinium* spp. - *Gaylussacia baccata* Woodland (CEGL005046), *Pinus rigida* - *Quercus (velutina, coccinea, prinus)* Forest (CEGL006290)

Eastern redcedar (*Juniperus virginiana*) woodlands

Eastern redcedar / Poverty oatgrass (*Juniperus virginiana* / *Danthonia spicata*) community

This xerophytic community is generally restricted to traprock ledges. Soil moisture ranges from dry to extremely dry. Locally dominant tree species include eastern redcedar (*Juniperus virginiana*) and white ash (*Fraxinus americana*), chestnut oak (*Quercus prinus*), and occasionally hophornbeam (*Ostrya virginiana*), with post oak (*Quercus stellata*) occurring locally along the coast. Shrubs include oaks (*Quercus ilicifolia*, *Q. prinoides*) and downy arrowwood (*Viburnum rafinesquianum*). Herb layer cover is discontinuous due to the blocky structure of the bedrock. Major herbaceous

species include grasses such as little bluestem (*Schizachyrium scoparium*), poverty oatgrass (*Danthonia spicata*) and panicgrass (*Dichanthelium linearifolium*, *D. acuminatum*), sedges (*Carex hirsutella*, *C. rosea*), and a variety of flowering herbs. Characteristic species include red columbine (*Aquilegia canadensis*), rock harlequin (*Corydalis sempervirens*), mountain mints (*Pycnanthemum* spp.), long-leaved bluets (*Houstonia longifolia*) and fall composites such as upland boneset (*Eupatorium sessilifolium*), woodland sunflower (*Helianthus divaricatus*), and goldenrods (*Solidago nemoralis*, *S. bicolor*). Mosses (*Polytrichum* spp.) and lichens (*Cladonia* spp., *Cladina* spp.) can be conspicuous.

Extent in Connecticut — Central Valley

Example — West Rock Ridge State Park, New Haven

Basis for description — Rozsa and Dowhan (1977), field descriptions

NatureServe cross-reference — *Juniperus virginiana* - *Fraxinus americana* / *Danthonia spicata* - *Poa compressa* Woodland (CEGL006002)

Eastern redcedar – Hophornbeam (*Juniperus virginiana* / *Ostrya virginiana*) community

This community is restricted to marble ledges and abandoned pastureland on dry calcareous soil. The canopy can be dominated by eastern redcedar (*Juniperus virginiana*) or composed of a mixture of eastern redcedar, hophornbeam (*Ostrya virginiana*), hickories (*Carya ovalis*, *C. glabra*), and occasionally, northern white cedar (*Thuja occidentalis*). Common hackberry (*Celtis occidentalis*) and tree saplings are the predominant shrubs. The herbaceous layer can be quite diverse, composed of plants characteristic of dry sites intermixed with plants restricted to calcareous sites. These include the following: little bluestem (*Schizachyrium scoparium*), bristleleaf sedge (*Carex eburnea*), Michaux's stitchwort (*Minuartia michauxii*), wild bergamot (*Monarda fistulosa*), ebony spleenwort (*Asplenium platyneuron*), grooved flax (*Linum sulcatum*), and fall composites such as asters (*Symphotrichum patens*, *S. undulatum*) and goldenrods (*Oligoneuron rigidum*, *Solidago nemoralis*, *S. bicolor*, *S. ulmifolia*). Mosses and lichens often form a conspicuous cover on bare soil and rock.

Extent in Connecticut — western marble valleys

Example — no examples with public access

Basis for description — field descriptions

NatureServe cross-reference — *Juniperus virginiana* - *Ostrya virginiana* / *Carex eburnea* Woodland (CEGL006180)

Black spruce (*Picea mariana*) saturated woodlands

Black spruce / Common mountain holly (*Picea mariana* / *Nemopanthus mucronata*) community

This community develops under oligotrophic conditions in peat-filled, saturated depressions or basins. Within this community several tree species may be present. Although black spruce (*Picea mariana*) is generally characteristic, tamarack (*Larix laricina*), red spruce (*Picea rubens*), eastern white pine (*Pinus strobus*), and/or pitch pine (*Pinus rigida*) can also occur or be dominant. The shrub layer can vary in density, with common mountain holly (*Nemopanthus mucronatus*) sometimes dominant. Other common shrubs include highbush blueberry (*Vaccinium corymbosum*), withe-rod (*Viburnum nudum* var. *cassinoides*), swamp azalea (*Rhododendron viscosum*), and common winterberry (*Ilex verticillata*). The herbaceous layer is also variable in cover, influenced by the patchiness of shrubs. Sheep laurel (*Kalmia angustifolia*), leatherleaf (*Chamaedaphne calyculata*), cranberry (*Vaccinium macrocarpon*), and roundleaf sundew (*Drosera rotundifolia*) are common. In wetter openings, species such as white beaksedge (*Rhynchospora alba*) and brownfruit rush (*Juncus pelocarpus*) can be dominant. Mosses can form a nearly continuous carpet, with *Sphagnum magellanicum* and *S. capillifolium*, and others.

Extent in Connecticut — scattered in northwestern Connecticut

Example — Wolcott Preserve, Norfolk (TNC)

Basis for description — Damman and French (1987), Perry (1987), field observations

NatureServe cross-references — *Picea rubens* - *Acer rubrum* / *Nemopanthus mucronatus* Forest (CEGL006198), *Picea mariana* / (*Vaccinium corymbosum*, *Gaylussacia baccata*) / *Sphagnum* sp. Woodland (CEGL006098), *Pinus rigida* / *Chamaedaphne calyculata* / *Sphagnum* sp. Woodland (CEGL006194)

WOODLANDS

Atlantic white cedar (*Chamaecyparis thyoides*) saturated woodlands

Atlantic white cedar (*Chamaecyparis thyoides*) / Leatherleaf (*Chamaedaphne calyculata*) community

This woodland community is found on saturated sites with largely bog-like conditions. The canopy is open with a well-developed understory. Atlantic white cedar (*Chamaecyparis thyoides*) is scattered throughout, with leatherleaf (*Chamaedaphne calyculata*) or swamp loosestrife (*Decodon verticillatus*) forming a thick understory. Other shrubs may include coastal sweet pepperbush (*Clethra alnifolia*), highbush blueberry (*Vaccinium corymbosum*), and swamp azalea (*Rhododendron viscosum*). *Sphagnum* mosses often form a carpet in open areas and beneath low shrubs. Cranberry (*Vaccinium macrocarpon*), purple pitcher plant (*Sarracenia purpurea*), and sundews (*Drosera* spp.) often occur.

Extent in Connecticut — uncommon in eastern and south central Connecticut

Example — Pachaug Great Meadows Natural Area Preserve, Voluntown

Basis for description — Barrett (1998), Metzler (1997), field descriptions

NatureServe cross-reference — *Chamaecyparis thyoides* / *Chamaedaphne calyculata* Woodland (CEGL006321)

DECIDUOUS WOODLANDS

(Deciduous tree species generally contribute to greater than 75% of the total tree cover.)

Scarlet oak – Sassafras (*Quercus coccinea* - *Sassafras albidum*) woodlands

Maritime scrub woodlands are poorly developed on the Connecticut coast due to limited coastal dune formation. This community occurs in the sheltered area below the dune crest offering little protection from salt spray. The vegetation is “pruned” by salt spray, and, as a result, it is generally of relatively short stature. Common tree species include black cherry (*Prunus serotina*), scarlet oak (*Quercus coccinea*), white oak (*Quercus alba*), sassafras (*Sassafras albidum*) and Canadian serviceberry (*Amelanchier canadensis*). Shrub species include

northern bayberry (*Morella pensylvanica*), southern arrowwood (*Viburnum dentatum* var. *lucidum*), black huckleberry (*Gaylussacia baccata*), Virginia rose (*Rosa virginiana*), and the non-native invasive honeysuckles (*Lonicera morrowii* and *L. japonica*). Many lianas occur, including eastern poison ivy (*Toxicodendron radicans*), roundleaf greenbrier (*Smilax rotundifolia*), Asian bittersweet (*Celastrus orbiculata*), and Virginia creeper (*Parthenocissus quinquefolia*). Herb layer species may include various sedges (*Carex* spp.), Blue Ridge blueberry (*Vaccinium pallidum*), Canada mayflower (*Maianthemum canadense*), and starry false lily of the valley (*Maianthemum stellatum*).

Extent in Connecticut — coastal Connecticut

Example — no examples with public access

Basis for description — Rozsa (unpublished report), field observations

NatureServe cross-references — *Prunus serotina* - *Sassafras albidum* - *Amelanchier canadensis* / *Smilax rotundifolia* Shrubland (CEGL006145), *Amelanchier canadensis* - *Viburnum* spp. - *Morella pensylvanica* Shrubland (CEGL006379)

Northern red oak / Rock polypody (*Quercus rubra* / *Polypodium virginianum*) woodlands

These woodlands occur on acidic, open, bouldery talus. The tree canopy is open to moderately closed, generally composed of red oak (*Quercus rubra*), sugar maple (*Acer saccharum*), yellow birch (*Betula alleghaniensis*), sweet birch (*Betula lenta*), American beech (*Fagus grandifolia*), white ash (*Fraxinus americana*), and occasionally eastern hemlock (*Tsuga canadensis*). Scattered and clumped tall shrubs/small trees such as mountain maple (*Acer spicatum*) and striped maple (*Acer pensylvanicum*) occur on particularly cold slopes, with blackberries (*Rubus* spp.) and several currants (*Ribes* spp.) usually more common. Vines are also characteristic, including Virginia creeper (*Parthenocissus quinquefolia*) and eastern poison ivy (*Toxicodendron radicans*). Occasionally, allegheny vine (*Adlumia fungosa*) and fringed black bindweed (*Polygonum cilinode*) can be present. Ferns and herbs are scattered in crevices where humus accumulates.

Extent in Connecticut — on acidic rock talus throughout Connecticut

WOODLANDS

Example — Lantern Hill, Ledyard (Mashantucket Pequot Tribal Nation)

Basis for description — field observations

NatureServe cross-reference — *Betula alleghaniensis* - *Quercus rubra* / *Polypodium virginianum* Woodland (CEGL006320)

Sweet birch – White ash / Robert geranium (*Betula lenta* - *Fraxinus americana* / *Geranium robertianum*) woodlands

These woodlands occur on rich, open talus. A heterogeneous mix of hardwoods and a characteristic rich herb flora dominate these woodlands. The canopy is open to semi-closed, composed of sugar maple (*Acer saccharum*), white ash (*Fraxinus americana*), American basswood (*Tilia americana*), red oak (*Quercus rubra*), sweet birch (*Betula lenta*), yellow birch (*Betula alleghaniensis*), butternut (*Juglans cinerea*), and hop hornbeam (*Ostrya virginiana*). Scattered and clumped tall shrubs/small trees include mountain maple (*Acer spicatum*), striped maple (*Acer pensylvanicum*), blackberries (*Rubus* spp.), roundleaf dogwood (*Cornus rugosa*), American bladdernut (*Staphylea trifolia*), and several currants (*Ribes* spp.). Scattered ferns and graminoids often include: marginal woodfern (*Dryopteris marginalis*), ebony spleenwort (*Asplenium platyneuron*), brittle bladderfern (*Cystopteris fragilis*), bulblet bladderfern (*Cystopteris bulbifera*), common ladyfern (*Athyrium filix-femina*), bluntlobe cliff fern (*Woodsia obtusa*), sedges (*Carex communis*, *C. rosea*, *C. sprengelii*, *C. platyphylla*), and blackseed ricegrass (*Piptatherum racemosum*). This talus woodland is differentiated by the presence of a diverse flora of herbs associated with alkaline soils, including early saxifrage (*Saxifraga virginensis*), Robert geranium (*Geranium robertianum*), purpleflowering raspberry (*Rubus odoratus*), rockcress (*Arabis* spp.), and Canadian wild ginger (*Asarum canadense*).

Extent in Connecticut — western marble valleys and central Connecticut traprock ridges

Example — Hubbard Park, Meriden

Basis for description — field observations

NatureServe cross-reference — *Acer saccharum* - *Tilia americana* - *Fraxinus americana* / *Ostrya*

virginiana / *Geranium robertianum* Woodland (CEGL005058)

Sugar maple – American basswood / Mountain maple (*Acer saccharum* - *Tilia americana* / *Acer spicatum*) woodlands

These woodlands occur on talus on cold, north-facing slopes or on talus in the northern hardwoods region of northwestern Connecticut. Scattered trees include sugar maple (*Acer saccharum*), American basswood (*Tilia americana*), white ash (*Fraxinus americana*), American beech (*Fagus grandifolia*) and yellow birch (*Betula alleghaniensis*). Shrubs often occur in discontinuous patches and include red elderberry (*Sambucus racemosa*), mountain maple (*Acer spicatum*), striped maple (*Acer pensylvanicum*), Eastern prickly gooseberry (*Ribes cynosbati*), and American witch hazel (*Hamamelis virginiana*). The herbaceous cover is variable, but often includes Canadian white violet (*Viola canadensis*), squirrel corn (*Dicentra canadensis*), Dutchman's-breeches (*Dicentra cucullaria*), Virginia waterleaf (*Hydrophyllum virginiana*), spotted touch-me-not (*Impatiens capensis*), and pale jewelweed (*Impatiens pallida*). Ferns and their allies, such as marginal woodfern (*Dryopteris marginalis*), intermediate woodfern (*Dryopteris intermedia*), brittle bladderfern (*Cystopteris fragilis*), and shining club-moss (*Huperzia lucidula*) are often conspicuous.

Extent in Connecticut — northwestern Connecticut

Example — Algonquin State Forest, Colebrook

Basis for description — field observations

NatureServe cross-reference — None

Red maple (*Acer rubrum*) seasonally flooded woodlands

Red maple / Hairy sedge (*Acer rubrum* / *Carex lacustris*) community

This community occurs in nutrient-rich lowlands, mainly in calcareous regions but also in gneiss areas of northwestern Connecticut. Soils vary in texture from a silt loam covered with organic matter to a peat or muck. The soil moisture regime varies from wet to very wet. In gneiss areas, this community is dependent on groundwater discharge for enrichment. Tree cover is generally open, with red maple (*Acer rubrum*) the dominant tree. Black

WOODLANDS

ash (*Fraxinus nigra*) also occurs. Shrub cover is generally low and includes various willows (e.g., *Salix candida*, *S. lucida*, *S. serissima*), gray alder (*Alnus incana* ssp. *rugosa*), red maple (*Acer rubrum*), and nannyberry (*Viburnum lentago*). The tall, dense patches of hairy sedge (*Carex lacustris*) are one of the most distinguishing features of this community. Other common herbaceous species include sensitive fern (*Onoclea sensibilis*), coastal-plain joepeyeweed (*Eupatorium dubium*), jewelweed (*Impatiens capensis*), marsh bellflower (*Campanula aparinoides*), fringed loosestrife (*Lysimachia ciliata*), and tussock sedge (*Carex stricta*).

Extent in Connecticut — western marble valleys

Example — Robbins Swamp Natural Area Preserve, Canaan

Basis for description — Messier (1980), Sawyer (1998), field descriptions

NatureServe cross-reference — *Acer rubrum* / *Carex lacustris* woodland (CEGL006105)

Red maple / Tussock sedge (*Acer rubrum* / *Carex stricta*) community

This community forms in flooded depressions that are wet for much of the growing season, on spring-fed slopes or seasonally flooded wetlands with altered hydrology. These swamps commonly form on highly organic silt loams, with strongly fluctuating water levels. The soil moisture regime varies from somewhat wet to wet. Red maple (*Acer rubrum*) trees are often scattered throughout this community. Under extremely wet conditions, red maple cover may be reduced and willows such as silky willow (*Salix sericea*) form the dominant shrub cover. Under more moderate conditions, shrub cover is often low, with shrubs such as alders (*Alnus* spp.), dogwoods (*Cornus amomum* and *C. sericea*), common buttonbush (*Cephalanthus occidentalis*), swamp rose (*Rosa palustris*), coastal sweet pepperbush (*Clethra alnifolia*), white meadowsweet (*Spiraea alba* var. *latifolia*) and other willows (*Salix* spp.) occurring. Tussock sedge (*Carex stricta*) is often dominant and gives these wetlands their characteristic appearance. Other herbaceous species include blunt spikerush (*Eleocharis obtusa*), rattlesnake mannagrass (*Glyceria canadensis*), common rush (*Juncus effusus*), eastern marsh fern (*Thelypteris palustris*), bluejoint (*Calamagrostis canadensis*), and marsh seedbox (*Ludwigia palustris*).

Extent in Connecticut — throughout Connecticut

Example — Nehantic State Forest, Lyme

Basis for description — Messier (1980), Metzler and Tiner (1995), Nichols (1915), field observations

NatureServe cross-reference — *Acer rubrum* / *Carex stricta* - *Onoclea sensibilis* Woodland (CEGL006119)

Red maple – Green ash (*Acer rubrum* - *Fraxinus pennsylvanica*) tidally flooded woodlands

Red maple – Green ash / Knotweed (*Acer rubrum* - *Fraxinus pennsylvanica* / *Polygonum* spp.) community

This community is best described as a freshwater tidal swamp. In Connecticut, its distribution is extremely limited, with known occurrences restricted to coves adjacent to the lower Connecticut River. Red maple (*Acer rubrum*) and green ash (*Fraxinus pennsylvanica*) are predominant, although American elm (*Ulmus americana*) can often be a regular component. Generally, the shrub layer forms dense patches intermixed with open, wet areas. Characteristic shrubs include common winterberry (*Ilex verticillata*), gray alder (*Alnus incana* ssp. *rugosa*), northern spicebush (*Lindera benzoin*), redosier dogwood (*Cornus sericea*), and common buttonbush (*Cephalanthus occidentalis*). In the openings, the herbaceous cover can be quite dense, with species similar to the adjacent freshwater tidal marsh. These include green arrow arum (*Peltandra virginica*), pickerelweed (*Pontederia cordata*), knotweeds (*Polygonum hydropiperoides*, *P. hydropiper*, *P. sagittatum*, *P. arifolium*), sensitive fern (*Onoclea sensibilis*), rice cutgrass (*Leersia oryzoides*), swamp milkweed (*Asclepias incarnata*), and various sedges (*Carex lupulina*, *C. stricta*, *C. crinita*, *C. comosa*). In some areas, patches of bluejoint (*Calamagrostis canadensis*) and reed canarygrass (*Phalaris arundinacea*) occur.

Extent in Connecticut — lower Connecticut River

Example — Haddam Neck Wildlife Area, Haddam

Basis for description — field descriptions

NatureServe cross-references — *Acer rubrum* / *Fraxinus pennsylvanica* / *Polygonum* spp. Woodland (CEGL006165)

WOODLANDS

MIXED EVERGREEN - DECIDUOUS WOODLANDS

(Evergreen and deciduous species contribute 25 -75% of total tree cover.)

Pitch pine – Post oak (*Pinus rigida* - *Quercus stellata*) woodlands

The structure of this woodland can be very variable, dependent on a host of environmental factors including microtopography, soil development/erosion, aspect and salt spray. Generally these woodlands are xerophytic and may include pitch pine (*Pinus rigida*), hickory species (*Carya tomentosa* and *C. glabra*), oaks (*Quercus stellata* and *Q. velutina*), Eastern redcedar (*Juniperus virginiana*), and black cherry (*Prunus serotina*). Depending on environmental conditions, these species may grow to only low shrub size. Other shrubs may include winged sumac (*Rhus copallinum*), northern bayberry (*Morella pensylvanica*), and desert false indigo (*Amorpha fruticosa*). Tangles of lianas, e.g., Virginia creeper (*Parthenocissus quinquefolia*) and eastern poison ivy (*Toxicodendron radicans*) can be conspicuous.

Along coastal bluffs, a variant of these woodlands contains eastern redcedar (*Juniperus virginiana*), post oak (*Quercus stellata*), and hickories (*Carya tomentosa* and *C. glabra*). Here, shrubs such as northern bayberry (*Morella pensylvanica*) occur. Additional herbaceous species on these bluffs include seaside goldenrod (*Solidago sempervirens*), other grasses and sedges (e.g., *Deschampsia flexuosa*, *Vulpia octoflora*, *Bromus tectorum*, *Panicum virgatum*, *Carex silicea*) and devil's tongue (*Opuntia humifusa*).

Extent in Connecticut — coastal New Haven and Middlesex counties

Example — Farm River State Park, East Haven

Basis for description — Nichols (1920), Rozsa (unpublished report), field observations

NatureServe cross-references — *Quercus stellata* - *Quercus velutina* / *Morella pensylvanica* / *Deschampsia flexuosa* Forest (CEGL006373), *Juniperus virginiana* var. *virginiana* / *Morella pensylvanica* Woodland (CEGL006212)





SHRUBLANDS

SHRUBLANDS

(Shrubs generally greater than 0.5 meter tall with individuals or clumps overlapping to not touching, generally forming more than 25% canopy coverage; tree cover generally less than 25%.)

DECIDUOUS SHRUBLANDS

(Deciduous species generally contribute more than 75% of the total shrub cover.)

Northern bayberry – Beach plum (*Morella pensylvanica* - *Prunus maritima*) shrublands

This shrub community occurs on well drained coastal moraines. These dense thickets are composed of shrubs (reaching an average height of 1.5 meters) and herbs (average height of 0.6 meter). Floristically, this community is composed of a mixture of northern bayberry (*Morella pensylvanica*), beach plum (*Prunus maritima*), eastern poison ivy (*Toxicodendron radicans*), beach rose (*Rosa rugosa*), and winged sumac (*Rhus copallinum*). Non-native invasive plants such as Asiatic bittersweet (*Celastrus orbiculatus*) and Japanese honeysuckle (*Lonicera japonica*) can be present and/or abundant. Characteristic herbs include starry false lily of the valley (*Maianthemum stellatum*), northern dewberry (*Rubus flagellaris*), Virginia rose (*Rosa virginiana*), Virginia creeper (*Parthenocissus quinquefolia*), seaside goldenrod (*Solidago sempervirens*), and flat-top goldenrod (*Euthamia graminifolia*).

Extent in Connecticut — coastal Connecticut

Example — Meig's Point, Hammonasset Natural Area Preserve, Clinton

Basis for description — Rozsa (unpublished report)

NatureServe cross-reference — *Morella pensylvanica* – *Prunus maritima* Shrubland (CEGL006295)

Bear oak (*Quercus ilicifolia*) shrublands

Few trees grow in the environmentally extreme summit environment under conditions of extreme dryness and poor soil. Soils of this community are extremely shallow, stable acidic soils over bedrock with soil moisture ranging from extremely dry to very dry. Bear oak (*Quercus ilicifolia*) characterizes this community with the density

dependent on site conditions. Scattered trees may include white oak (*Quercus alba*), pitch pine (*Pinus rigida*), and pignut hickory (*Carya glabra*). The herbaceous layer is composed of ericaceous species (*Vaccinium angustifolium*, *V. pallidum*, and *Gaylussacia baccata*). Sandcherry (*Prunus pumila* var. *susquehanae*), bastard toadflax (*Comandra umbellata*), little bluestem (*Schizachyrium scoparium*), poverty oatgrass (*Danthonia spicata*), sedges (*Carex umbellata*, *C. pensylvanica*, and others), and black chokeberry (*Photinia melanocarpa*) are conspicuous in openings.

Extent in Connecticut — on dry summits throughout the state

Example — Canaan Mountain Natural Area Preserve, Canaan/North Canaan

Basis for description — Kershner (1975), field descriptions

NatureServe cross-reference — *Quercus ilicifolia* – *Prunus pumila* Shrubland (CEGL006121)

Black willow (*Salix nigra*) temporarily flooded shrublands

Black willow / Fall panicgrass (*Salix nigra* / *Panicum dichotomiflorum*) community

This is a transitional community along rivers, separating the herbaceous riverbank vegetation from the low floodplain. While located above normal river water level fluctuations during the summer, this community is scoured by ice during spring breakup and flooded during seasonal spring flood events. Soil moisture regime varies from moist to somewhat wet. Black willow (*Salix nigra*) is the dominant shrub or low tree. Annual herbaceous vegetation composition and development are highly variable from year to year but often include fall panicgrass (*Panicum dichotomiflorum*), barnyardgrass (*Echinochloa crus-galli*), several species of beggarticks (*Bidens* spp.), and smartweeds (*Polygonum* spp.).

Extent in Connecticut — on low banks of larger rivers

Example — Folly Brook Natural Area, Wethersfield (Great Meadows Land Trust)

Basis for description — Metzler and Damman (1985)

SHRUBLANDS

NatureServe cross-reference — none

Speckled alder (*Alnus incana* ssp. *rugosa*) temporarily flooded shrublands

Speckled alder – Willow (*Alnus incana* ssp. *rugosa* – *Salix* spp.) community

This swamp community occurs along streams and on the edge of open wetlands where the soil is influenced by seasonal flooding. The soil moisture regime is very wet. Alders (*Alnus incana* ssp. *rugosa* and *A. serrulata*) are the most common shrubs of these thickets. Many other shrubs can co-occur with the alders, including willows (*Salix discolor* and *S. sericea*), common buttonbush (*Cephalanthus occidentalis*), highbush blueberry (*Vaccinium corymbosum*), coastal sweet pepperbush (*Clethra alnifolia*), silky dogwood (*Cornus amomum*), common winterberry (*Ilex verticillata*), meadowsweet (*Spiraea alba* var. *latifolia*), steeplebush (*S. tomentosa*), and swamp azalea (*Rhododendron viscosum*). Tussock sedge (*Carex stricta*) may also be present.

A variant of this community occurs on open seeps with a gentle slope. Water flow through the area is slow, with the water table above the soil surface throughout most years. The soil moisture regime is very wet. Silky willow (*Salix sericea*) is the predominant species of these swamps. Shrub cover is generally dense and ranges from one to three meters in height depending on species composition. Red maple (*Acer rubrum*) trees may occur on hummocks, but tree cover is very low due to the very wet conditions. Other shrubs include common buttonbush (*Cephalanthus occidentalis*), silky dogwood (*Cornus amomum*), redosier dogwood (*Cornus sericea*), meadowsweet (*Spiraea alba* var. *latifolia*), and swamp rose (*Rosa palustris*). Characteristic herbs include ditch stonecrop (*Penthorum sedoides*), marsh fern (*Thelypteris palustris*), marsh seedbox (*Ludwigia palustris*), and tussock sedge (*Carex stricta*). The most common bryophyte is *Warnstorfia fluitans*.

Extent in Connecticut — throughout Connecticut

Example — Little Pond, Litchfield (White Memorial Foundation)

Basis for description — Messier (1980), Nichols (1915)

NatureServe cross reference — *Alnus serrulata*

Eastern Shrubland (CEGL005082), *Alnus incana* – *Cornus sericea* / *Clematis virginiana* Shrubland (CEGL006062)

Highbush blueberry (*Vaccinium corymbosum*) seasonally flooded shrublands

Highbush blueberry – Swamp azalea (*Vaccinium corymbosum* - *Rhododendron viscosum*) community

These wetland thickets occur in glacial kettles and other undrained depressions with organic soils influenced by strongly fluctuating water levels, or as high shrub thickets within dwarf shrub bogs. The soil moisture regime is wet to very wet. The depressions are flooded during spring and early summer, followed by a drop in water level to below the soil surface in late summer and early fall. Although dominated by highbush blueberry (*Vaccinium corymbosum*) and swamp azalea (*Rhododendron viscosum*), scattered red maple (*Acer rubrum*), blackgum (*Nyssa sylvatica*), and alders (*Alnus* spp.) may occur. Herbaceous cover is generally low and may include royal fern (*Osmunda regalis*), cinnamon fern (*Osmunda cinnamomea*), fowl mannagrass (*Glyceria striata*), water arum (*Calla palustris*), and others. Moss cover is variable, but can often cover the ground surface. Moss species that may be present include *Sphagnum fimbriatum*, *S. rubellum*, *S. magellanicum* and *S. fallax*.

Extent in Connecticut — throughout Connecticut, absent in the western marble valleys

Example — Pachaug State Forest, Voluntown

Basis for description — Damman and French (1987), Perry (1987), field observations

NatureServe cross-reference — *Vaccinium corymbosum* / *Sphagnum* spp. Shrubland (CEGL006190), *Vaccinium corymbosum* - *Rhododendron viscosum* - *Clethra alnifolia* Shrubland (CEGL006371)

Shrubby cinquefoil (*Dasiphora floribunda*) seasonally flooded shrublands

Shrubby cinquefoil – Bog birch / Hairy sedge (*Dasiphora floribunda* - *Betula pumila* / *Carex lacustris*) community

This shrub fen occurs on base-rich organic soils with regular inundation and surface flooding. The soil moisture regime is very wet. This community

SHRUBLANDS

is composed of a shrub layer characterized by species including bog birch (*Betula pumila*), shrubby cinquefoil (*Dasiphora floribunda*), red maple saplings (*Acer rubrum*), redosier dogwood (*Cornus sericea*) and willow species (*Salix* spp.). Characteristic herbaceous species include hairy sedge (*Carex lacustris*), bluejoint (*Calamagrostis canadensis*), cattails (*Typha* spp.), tufted loosestrife (*Lysimachia thrysiflora*), eastern marsh fern (*Thelypteris palustris*), and water horsetail (*Equisetum fluviatile*).

Extent in Connecticut — western marble valleys

Example — Beeslick Pond, Salisbury (TNC)

Basis for description — Motzkin (1992), field descriptions

NatureServe cross-reference — *Betula pumila* - *Toxicodendron vernix* - *Dasiphora fruticosa* ssp. *floribunda* Shrubland (CEGL006360)

Shrubby cinquefoil – Sageleaf willow – Silky dogwood / Tussock sedge (*Dasiphora floribunda* - *Salix candida* - *Cornus amomum* / *Carex stricta*) community

Dense patches of shrubs interspersed with small graminoid openings characterize this fen. Silky dogwood (*Cornus amomum*), redosier dogwood (*Cornus sericea*), and several willows (*Salix candida*, *S. petiolaris*, *S. serissima*, and *S. discolor*) are dominant and characteristic of this association. Other shrubs include shrubby cinquefoil (*Dasiphora floribunda*), alder (*Alnus incana* ssp. *rugosa*), and poison sumac (*Toxicodendron vernix*). Tussock sedge (*Carex stricta*) is the dominant and characteristic sedge, with other herbaceous associates including spotted joepeyeweed (*Eupatorium maculatum*), roundleaf goldenrod (*Solidago patula*), bog goldenrod (*Solidago uliginosa*), nodding ladies'-tresses (*Spiranthes cernua*), eastern marsh fern (*Thelypteris palustris*), spiked muhly (*Muhlenbergia glomerata*), fen grass of Parnassas (*Parnassia glauca*), and hairy sedge (*Carex lacustris*).

Extent in Connecticut — western marble valleys

Example — Benton Hill Fen, Sharon (TNC)

Basis for description — Motzkin (1992), field descriptions

NatureServe cross-reference — *Cornus amomum* -

Salix candida / *Dasiphora fruticosa* ssp. *floribunda* / *Carex stricta* Shrubland (CEGL006359)

Shrubby cinquefoil – Sweetgale / Woollyfruit sedge – Twigrush (*Dasiphora floribunda* - *Myrica gale* / *Carex lasiocarpa* - *Cladium mariscoides*) community

This association is a calcareous fen overlying deep peat accumulations of lakes and other bodies of water. It is characterized by rhizomatous mat-forming sedges, with a variable shrub cover. Typical sedges include *Carex lasiocarpa*, *Carex prairea*, *Carex leptalea*, *Carex stricta*, and *Cladium mariscoides*. Shrubs are generally confined to hummocks, but cover varies among occurrences. Characteristic shrubs include sweetgale (*Myrica gale*), shrubby cinquefoil (*Dasiphora floribunda*), bog birch (*Betula pumila*), sageleaf willow (*Salix candida*), alderleaf buckthorn (*Rhamnus alnifolia*), alders (*Alnus* spp.), and redosier dogwood (*Cornus sericea*). Tamarack (*Larix laricina*) and/or eastern white pine (*Pinus strobus*) may occur as scattered individuals atop hummocks. Hollows and channels often support bladderworts (*Utricularia intermedia*, *U. gibba*) and buckbean (*Menyanthes trifoliata*). Other herbs include purple pitcherplant (*Sarracenia purpurea*), hardstem bulrush (*Schoenoplectus acutus*), and cattail (*Typha* spp.). Characteristic mosses include *Campyllum stellatum*, *Limprichtia revolvens*, *Scorpidium scorpioides*, and *Tomentothypnum nitens*. *Sphagnum* spp. may be absent or are minor components. Species include the more minerotrophic *Sphagnum contortum*, *Sphagnum warnstorffii* and *Sphagnum teres*.

Extent in Connecticut — western marble valleys

Example — Beeslick Pond, Salisbury (TNC)

Basis for description — Motzkin (1992), field descriptions

NatureServe cross-reference — *Myrica gale* - *Dasiphora fruticosa* ssp. *floribunda* / *Carex lasiocarpa* - *Cladium mariscoides* Shrub Herbaceous Vegetation (CEGL006068)

Common buttonbush (*Cephalanthus occidentalis*) semipermanently flooded shrublands

Common buttonbush / Rattlesnake mannagrass (*Cephalanthus occidentalis* / *Glyceria canadensis*) community

SHRUBLANDS

This swamp community is commonly found along pond and lake borders or in undrained depressions with seasonal flooding. The substratum of lake-border swamps is often a silt loam high in organic matter, whereas the substratum of perched swamps is usually muck. The soil moisture regime is very wet. The water table is often well above the soil surface in early spring, dropping slightly below it by late summer. Common buttonbush (*Cephalanthus occidentalis*) is the dominant shrub, often forming a continuous cover. Other shrubs such as swamp azalea (*Rhododendron viscosum*) and highbush blueberry (*Vaccinium corymbosum*) commonly occur along the upland edges. Rattlesnake mannagrass (*Glyceria canadensis*), threeway sedge (*Dulichium arundinaceum*), tussock sedge (*Carex stricta*), woolgrass (*Scirpus cyperinus*) and marsh seedbox (*Ludwigia palustris*) often occur on hummocks. Moss cover is generally low, and often includes *Warnstorfia fluitans* and/or *Sphagnum fallax*.

Extent in Connecticut — wetlands throughout Connecticut

Example — Babcock Pond Wildlife Area, Colchester

Basis for description — Messier (1980), Perry (1987), field descriptions

NatureServe cross-reference — *Cephalanthus occidentalis* / *Glyceria canadensis* Shrubland (CEGL006069)

Swamp loosestrife (*Decodon verticillatus*) semipermanently flooded shrublands

Swamp loosestrife (*Decodon verticillatus*) can dominate semipermanently to permanently flooded shallow water, particularly pond edges, shallow glacial kettles, and bog pools and borders. Usually growing as a monoculture, swamp loosestrife is associated with few other plants, although common buttonbush (*Cephalanthus occidentalis*) can sometimes occur. Aquatic plants such as pickerelweed (*Pontederia cordata*), green arrow arum (*Peltandra virginica*), pondweeds (*Potamogeton* spp.), water/pond lilies (*Nymphaea odorata*, *Nuphar variegata*), and certain mosses can be mixed in patches of open water. In some areas, purple loosestrife (*Lythrum salicaria*) can appear co-dominant.

Extent in Connecticut — throughout Connecticut

Example — Babcock Pond Wildlife Area, Colchester

Basis for description — field observations

NatureServe cross-reference — *Decodon verticillatus* Semipermanently Flooded Shrubland (CEGL005089)

Northern marshelder (*Iva frutescens*) tidally flooded shrublands

Northern marshelder / Switchgrass (*Iva frutescens* / *Panicum virgatum*) community

This community develops between the high salt marsh and the upland vegetation. The area is above the level of mean high tide, but can be subject to infrequent tidal events as during storm surges. Salinity levels are generally lower than in the salt marsh. The soil substrate is often an organic peaty material, overlying glacial till. Along the Connecticut coast, nearly all of the salt marshes were ditched in the 1930s in an effort to control mosquito populations. The spoils were deposited along the margins of the creek channels, and this plant community occurs in linear strips on the spoils.

Species composition of this community is dependent on the degree of freshwater influence from groundwater. Characteristic shrubs include northern marshelder (*Iva frutescens*) and eastern baccharis (*Baccharis halimifolia*). Several grasses are characteristic of this community: saltmeadow rush (*Juncus gerardii*), switchgrass (*Panicum virgatum*), and saltmeadow cordgrass (*Spartina patens*). Other herbaceous species include vanilla grass (*Hierochloë odorata*), prairie cordgrass (*Spartina pectinata*), seaside germander (*Teucrium canadense*), and seaside goldenrod (*Solidago sempervirens*). This community type is generally linear, but can vary in width.

Extent in Connecticut — coastal Connecticut

Examples — Barn Island Wildlife Area, Stonington; Hammonasset State Park, Madison

Basis for description — Barrett (1989), Miller and Eglar (1950), Nichols (1920), Nixon (1982)

NatureServe cross-reference — *Baccharis halimifolia* - *Iva frutescens* / *Spartina patens* Shrubland (CEGL003921)

Speckled alder – Silky dogwood – Common winterberry (*Alnus incana* ssp. *rugosa* - *Cornus*

SHRUBLANDS

amomum - Ilex verticillata) tidally flooded shrublands

These tidally flooded shrublands occur along the freshwater portion of tidal-river shores. It is best developed between mean high water and spring mean high water. This community is subject to semi-diurnal flooding, and the substrate is continuously wet. The soil is a fine silty loam to loamy sand characteristic of levees created by spring river discharge. A great deal of microrelief (tussocks and hollows) leads in part to high species diversity. Shrubs may form dense thickets or be present only as scattered individuals within an herbaceous marsh. Common shrubs often include speckled alder (*Alnus incana* ssp. *rugosa*), swamp rose (*Rosa palustris*), common winterberry (*Ilex verticillata*), silky dogwood (*Cornus amomum*), red elderberry

(*Sambucus racemosa*), willow species (*Salix* spp.), desert false indigo (*Amorpha fruticosa*), common buttonbush (*Cephalanthus occidentalis*), eastern poison ivy (*Toxicodendron radicans*), southern arrowwood (*Viburnum dentatum* var. *lucidum*), and white meadowsweet (*Spiraea alba* var. *latifolia*).

Extent in Connecticut — lower Connecticut River

Example — Seldon Island Natural Area Preserve, Lyme

Basis for description — Barrett (1989)

NatureServe cross-reference — *Alnus (incana* spp. *rugosa, serrulata)* - *Cornus amomum* Shrubland (CEGL006337)



**DWARF-
SHRUBLANDS**

DWARF-SHRUBLANDS

(Low-growing shrubs usually under 0.5 meter tall. Individuals or clumps not touching to overlapping.)

EVERGREEN DWARF-SHRUBLANDS

(Evergreen species generally contribute more than 75% of the total dwarf-shrub cover.)

False beachheather (*Hudsonia tomentosa*) dwarf-shrublands

These dwarf-shrublands occur on coastal sand flats behind dunes covered by American beachgrass (*Ammophila breviligulata*). The substrate is sand and gravel with a moisture regime of very dry. No trees and few, if any, shrubs are present. False beachheather (*Hudsonia tomentosa*) is often the dominant species, although dusty miller (*Artemisia stelleriana*), American beachgrass (*Ammophila breviligulata*), beach sedge (*Carex silicea*), northern evening-primrose (*Oenothera parviflora*), and coastal jointweed (*Polygonella articulata*) may commonly occur.

Extent in Connecticut — rare, southeast coastal Connecticut

Example — Bluff Point Natural Area Preserve, Groton

Basis for description — Rozsa (unpublished report), field descriptions

NatureServe cross-reference — *Hudsonia tomentosa* - *Arctostaphylos uvi-ursi* Dwarf-shrubland (CEGL006143)

Kinnikinnick–Lowbush blueberry (*Arctostaphylos uvi-ursi* - *Vaccinium angustifolium*) dwarf-shrublands

These dwarf-shrublands occur on rock summits. Overhanging tree species from adjacent communities include red and black oak (*Quercus rubra* and *Q. velutina*), eastern hemlock (*Tsuga canadensis*), eastern white pine (*Pinus strobus*) and eastern redcedar (*Juniperus virginiana*). The shrub cover is low, including bear oak (*Quercus ilicifolia*), eastern redcedar and gray birch (*Betula populifolia*). The herbaceous layer cover is dominated by kinnikinnick (*Arctostaphylos uvi-ursi*), broomsedge bluestem (*Andropogon virginicus*), and poverty oatgrass (*Danthonia spicata*). Other species may include

lowbush blueberries (*Vaccinium angustifolium*, *V. pallidum*), black huckleberry (*Gaylussacia baccata*), and, on deeper soils, Canada mayflower (*Maianthemum canadense*) and white goldenrod (*Solidago bicolor*).

Extent in Connecticut — rare, traprock ridges

Example — Talcott Mountain State Park, Simsbury

Basis for description — field descriptions

NatureServe cross-reference — *Vaccinium angustifolium* - *Sorbus americana* / *Sibbaldiopsis tridentata* Dwarf-shrubland (CEGL005094)

Leatherleaf (*Chamaedaphne calyculata*) saturated dwarf-shrublands

Leatherleaf / Black spruce (*Chamaedaphne calyculata* / *Picea mariana*) community

This community occurs in glacial kettle holes and along the margins of oligotrophic ponds. The soils are usually poorly decomposed peats of variable depths. The soil moisture regime is wet to very wet. Trees rarely occur. Shrub cover is usually low, and may include black spruce (*Picea mariana*), eastern white pine (*Pinus strobus*), Atlantic white cedar (*Chamaecyparis thyoides*), swamp azalea (*Rhododendron viscosum*), rhodora (*Rhododendron canadense*), and highbush blueberry (*Vaccinium corymbosum*). Dwarf shrubs dominate, with leatherleaf (*Chamaedaphne calyculata*) most conspicuous. Additional dwarf shrubs include bog laurel (*Kalmia polifolia*), sheep laurel (*Kalmia angustifolia*), and occasionally dwarf huckleberry (*Gaylussacia dumosa*). Scattered herbs include purple pitcherplant (*Sarracenia purpurea*), small cranberry (*Vaccinium oxycoccus*), tawny cottongrass (*Eriophorum virginicum*), and Billing's sedge (*Carex trisperma* var. *billingsii*). Moss cover is variable, with *Sphagnum rubellum* and *Sphagnum magellanicum* often dominant. *Sphagnum fallax* is sometimes present.

Extent in Connecticut — northern Connecticut

Example — no examples with public access

Basis for description — Damman and French (1987), Messier (1980), Perry (1987), Sperduto and Crowley (2002)

NatureServe cross-reference — *Chamaedaphne calyculata* - (*Gaylussacia dumosa*) - *Decodon verticillatus* / *Woodwardia virginica* Dwarf-

DWARF-SHRUBLANDS

shrubland (CEGL006008), *Picea mariana* / (*Vaccinium corymbosum*, *Gaylussacia baccata*) / *Sphagnum* sp. Woodland (CEGL006098)

Leatherleaf / White beaksedge (*Chamaedaphne calyculata* / *Rhynchospora alba*) community

This community occurs on wet peat within glacial kettle holes and along the margins of oligotrophic ponds. The soils are usually poorly decomposed peats of variable depths. The soil moisture regime is wet to very wet. Tree and shrub cover is absent. Herb-layer coverage is variable, with species including small cranberry (*Vaccinium oxycoccus*), cranberry (*Vaccinium macrocarpon*), leatherleaf (*Chamaedaphne calyculata*), and purple pitcherplant (*Sarracenia purpurea*). White beaksedge (*Rhynchospora alba*) is always present and its abundance distinguishes this community from other leatherleaf community types. Occasionally, yelloweyed grasses (*Xyris* spp.) and spoonleaf sundew (*Drosera intermedia*) also occur. Mosses form a nearly continuous carpet and include *Sphagnum rubellum* and *Sphagnum magellanicum*. The liverwort *Cladopodiella fluitans* occurs occasionally.

Extent in Connecticut — northern Connecticut

Example — no examples with public access

Basis for description — Damman and French (1987), Messier (1980), Perry (1987)

NatureServe cross-reference — *Chamaedaphne calyculata* - (*Gaylussacia dumosa*) - *Decodon verticillatus* / *Woodwardia virginica* Dwarf-shrubland (CEGL006008)

Leatherleaf / Virginia marsh St. Johnswort (*Chamaedaphne calyculata* / *Triadenum virginicum*) community

This community occurs in basins and wet depressions. Soil moisture regime ranges from moist to wet. A dense cover of dwarf shrubs characterizes this community. Leatherleaf (*Chamaedaphne calyculata*) is the dominant dwarf shrub, and sheep laurel (*Kalmia angustifolia*) is often present. Herbaceous species include Virginia marsh St. Johnswort (*Triadenum virginicum*), sedges (*Carex lasiocarpa* and *C. trisperma* var. *billingsii*), and purple pitcherplant (*Sarracenia purpurea*). The moss layer has variable cover (30-100%) with *Sphagnum magellanicum*, *S. rubellum*, and *S. fimbriatum* most abundant.

Extent in Connecticut — northern and eastern Connecticut

Example — Pachaug State Forest, Voluntown

Basis for description — Damman and French (1987), Perry (1987)

NatureServe cross-reference — *Chamaedaphne calyculata* - (*Gaylussacia dumosa*) - *Decodon verticillatus* / *Woodwardia virginica* Dwarf-shrubland (CEGL006008)

Leatherleaf / Northwest Territory sedge (*Chamaedaphne calyculata* / *Carex utriculata* var. *rostrata*) community

This community occurs in basins and wet depressions. The water table typically rises above the surface during wet periods. The vegetation is influenced by nutrient poor minerotrophic water. The soil moisture regime is wet to very wet with the peat layer often less than one meter deep. This community can have a sparse tree and shrub cover of red maple (*Acer rubrum*), highbush blueberry (*Vaccinium corymbosum*), swamp azalea (*Rhododendron viscosum*), and common winterberry (*Ilex verticillata*), or no shrubs at all. In some areas, Northwest Territory sedge (*Carex utriculata* var. *rostrata*) can be dominant. Other plants may be scattered throughout, e.g., leatherleaf (*Chamaedaphne calyculata*), cranberry (*Vaccinium macrocarpon*) and spireas (*Spirea* spp.). Herbaceous species present include threeway sedge (*Dulichium arundinaceum*), white beaksedge (*Rhynchospora alba*), and tawny cottongrass (*Eriophorum virginicum*). Moss cover is high and is generally dominated by *Sphagnum papillosum* and *S. fallax*.

Extent in Connecticut — northern and eastern Connecticut

Example — Pachaug State Forest, Voluntown

Basis for description — Damman and French (1987), Perry (1987)

NatureServe cross-reference — *Myrica gale* - *Chamaedaphne calyculata* / *Carex (lasiocarpa, utriculata)* - *Utricularia* spp. Shrub Herbaceous Vegetation (CEGL006302)

Sweetgale (*Myrica gale*) saturated dwarf-shrublands

DWARF-SHRUBLANDS

Sweetgale – White meadowsweet – Leatherleaf (*Myrica gale* – *Spiraea alba* - *Chamaedaphne calyculata*) community

This community forms a shrubby border of variable width on the margins of slow-moving, acidic streams, lakes, or ponds, often grading into a saturated wetland forest or bog. The substrate often forms hummocks of well-decomposed peat or muck of various depths. Standing water is present between the hummocks throughout most or all of the growing season. Dwarf shrubs are dominant, with sweetgale (*Myrica gale*), white meadowsweet (*Spiraea alba*), steeplebush (*Spiraea tomentosa*), and leatherleaf (*Chamaedaphne calyculata*) characteristic. Additional shrubs can include rhodora (*Rhododendron canadense*), speckled alder (*Alnus incana* ssp. *rugosa*), swamp rose (*Rosa palustris*), and saplings of red maple (*Acer rubrum*), Atlantic white cedar (*Chamaecyparis thyoides*), or black spruce (*Picea mariana*). The herbaceous layer is generally sparse but diverse, including sedges (*Carex stricta*, *Carex utriculata*, *Carex lasiocarpa*, *Carex canescens*), bog aster (*Oclemena nemoralis*), royal fern (*Osmunda regalis*), Virginia marsh St. Johnswort (*Triadenum virginicum*), threeway sedge (*Dulichium arundinaceum*), Canadian rush (*Juncus canadensis*), purple marshlocks (*Comarum palustre*), and swamp candles (*Lysimachia terrestris*). *Sphagnum* spp. generally carpet the hummocks.

Extent in Connecticut — northeastern Connecticut

Example — Lower Pond, Thompson (Wyndham Land Trust)

Basis for description — field descriptions

NatureServe cross-reference — *Myrica gale* - *Spiraea alba* - *Chamaedaphne calyculata* Shrubland (CEGL006512)

DECIDUOUS DWARF-SHRUBLANDS

(Deciduous species generally contribute more than 75% of the total dwarf-shrub cover.)

Black huckleberry (*Gaylussacia baccata*) saturated dwarf-shrublands

This community occurs on firm peat in glacial kettle holes and along the margins of oligotrophic ponds. This community occupies the driest areas with respect to other dwarf-shrub bogs. Tree and high shrub species may be present but have very low cover. Black

huckleberry (*Gaylussacia baccata*) dominates the dwarf-shrub layer. Sheep laurel (*Kalmia angustifolia*) and leatherleaf (*Chamaedaphne calyculata*) may also be abundant. Other species that may be present include roundleaf sundew (*Drosera rotundifolia*) and black chokeberry (*Photinia melanocarpa*). Mosses generally form a continuous carpet under the shrubs. Common bryophytes include *Sphagnum magellanicum* and *S. rubellum*.

Extent in Connecticut — northern Connecticut

Example — no examples with public access

Basis for description — Damman and French (1987), Perry (1987)

NatureServe cross-reference — *Chamaedaphne calyculata* - (*Gaylussacia dumosa*) – *Decodon verticillatus* / *Woodwardia virginica* Dwarf-shrubland (CEGL006008)

Dwarf huckleberry (*Gaylussacia dumosa*) saturated dwarf-shrublands

This community occurs in wet peat in glacial kettle holes and along the margins of oligotrophic ponds. Tree and high shrub species are generally sparse, with eastern white pine (*Pinus strobus*), gray birch (*Betula populifolia*), swamp azalea (*Rhododendron viscosum*), and/or highbush blueberry (*Vaccinium corymbosum*). The dwarf-shrub layer is dominated by dwarf huckleberry (*Gaylussacia dumosa*), often with sheep laurel (*Kalmia angustifolia*) and leatherleaf (*Chamaedaphne calyculata*) intermixed. Swamp loosestrife (*Decodon verticillatus*) and green arrow arum (*Peltandra virginica*) are frequent on wetter occurrences. Other species that may be present include Virginia chainfern (*Woodwardia virginica*), bog laurel (*Kalmia polifolia*), and purple pitcherplant (*Sarracenia purpurea*). Mosses generally form a continuous carpet under the shrubs. Common bryophytes include *Sphagnum cuspidatum* and/or *Sphagnum magellanicum* and *S. rubellum*.

Extent in Connecticut — central Connecticut

Example — no examples with public access

Basis for description — Damman and French (1987), Perry (1987)

NatureServe cross-reference — *Chamaedaphne calyculata* - (*Gaylussacia dumosa*) – *Decodon verticillatus* / *Woodwardia virginica* Dwarf-shrubland (CEGL006008)



***HERBACEOUS
VEGETATION***

F. Leh 03

HERBACEOUS VEGETATION

(Herbs, graminoids, forbs, and ferns dominant, generally forming at least 25% cover. Trees, shrub and dwarf-shrubs generally less than 25% cover.)

GRAMINOID VEGETATION

(Perennial graminoids generally contribute more than 50% of the total herbaceous cover.)

Big bluestem – Indiangrass (*Andropogon gerardii* - *Sorghastrum nutans*) tall grasslands

These grasslands have a very limited distribution in Connecticut known from only a few sites on dry, sandy alluvial levees or on sandy terraces with associated glaciofluvial deposits. The soils are well-drained sands, and in some occurrences can be flooded during extreme events. These grasslands are dominated by three tall grasses: big bluestem (*Andropogon gerardii*), Indiangrass (*Sorghastrum nutans*), and switchgrass (*Panicum virgatum*) with several other grasses and forbs, intermixed with scattered shrubs. Associated plants include little bluestem (*Schizachyrium scoparium*), rushes (*Juncus* spp.), fall witchgrass (*Digitaria cognata*), and numerous fall composites, e.g., asters and goldenrods.

Extent in Connecticut — central Connecticut

Example — Higganum Meadows Natural Area Preserve, Haddam

Basis for description — field descriptions

NatureServe cross-reference — *Andropogon gerardii* - *Sorghastrum nutans* Herbaceous Vegetation (CEGL006518)

Little bluestem – Poverty oatgrass (*Schizachyrium scoparium* – *Danthonia spicata*) medium-tall grasslands

Little bluestem – Orangegrass (*Schizachyrium scoparium* - *Hypericum gentianoides*) community

These grassland glades occur on dry, sandy soils of glacial outwash plains or on shallow soils and ledges of hilltops. These glades often form a mosaic with Pitch pine / Bear oak woodlands and bare bedrock surfaces. The soils are well drained to excessively drained medium-fine sand

or coarse gravel, or are very shallow to bedrock. Little bluestem (*Schizachyrium scoparium*) is the most common species. This community generally occurs in openings within dry oak, pine, or mixed oak/pine types. Trees can be irregularly scattered throughout the sand plains, predominantly pitch pine (*Pinus rigida*), black oak (*Quercus velutina*), and gray birch (*Betula populifolia*). Two annuals occur commonly in this community: orangegrass (*Hypericum gentianoides*) and forked bluecurls (*Trichostema dichotomum*). Other associated herbaceous species include poverty oatgrass (*Danthonia spicata*), sedges (*Carex pensylvanica*, *C. umbellata*), Canada toadflax (*Nuttallanthus canadensis*), common milkweed (*Asclepias syriaca*), wild indigo (*Baptisia tinctoria*), roundhead lespedeza (*Lespedeza capitata*), and common evening-primrose (*Oenothera biennis*). Lowbush blueberries (*Vaccinium angustifolium*, *V. pallidum*) are often regular components. Typically, haircap mosses (*Polytrichum* spp.) and lichens (*Cladonia* spp., *Cladina* spp, and *Cetraria arenaria*) occur throughout.

Extent in Connecticut — central and eastern Connecticut

Example — Winding Trails Recreation Area, Farmington

Basis for description — Britton (1903), Damman and Kershner (1977), Nichols (1913), Olmsted (1937)

NatureServe cross-reference — *Schizachyrium scoparium* - *Danthonia spicata* - *Carex pensylvanica* / *Cladina* spp. Herbaceous Vegetation (CEGL006544)

Little bluestem / Sesquehana sandcherry (*Schizachyrium scoparium* / *Prunus pumila* var. *susquehanae*) community

On open summits, areas of exposed acidic bedrock form a mosaic with areas covered by mosses, lichens and scrubby, herbaceous vegetation. Soil moisture regime is extremely dry. A few small, stunted trees may be scattered throughout this community: gray birch (*Betula populifolia*) and pin cherry (*Prunus pensylvanica*). White meadowsweet (*Spiraea alba*) and Sesquehana sandcherry (*Prunus pumila* var. *susquehanae*) may also be found in the shrub layer. The herbaceous layer includes little bluestem (*Schizachyrium scoparium*), Greene's rush (*Juncus greenii*), orangegrass (*Hypericum gentianoides*),

HERBACEOUS VEGETATION

Pennsylvania sedge (*Carex pensylvanica*), a densetuft hairsedge (*Bulbostylis capillaris*), and poverty oatgrass (*Danthonia spicata*), as well as lichens (*Cladonia* spp.) and mosses (*Polytrichum* spp.) on the bare rock surface. In some areas, lowbush blueberries (*Vaccinium vacillans*, *V. angustifolium*) can occur in large patches.

Extent in Connecticut — scattered on bedrock summits throughout Connecticut

Example — Pond Mountain Natural Area, Kent (Pond Mountain Trust)

Basis for description — Kershner (1975)

NatureServe cross-reference — *Schizachyrium scoparium* - *Danthonia spicata* - *Carex pensylvanica* / *Cladonia* spp. Herbaceous Vegetation (CEGL006544)

Little bluestem – Sideoats grama (*Schizachyrium scoparium* - *Bouteloua curtipendula*) medium-tall grasslands

This grassland occurs on openings in Sugar maple – Chinkapin oak forests where marble bedrock is exposed and creates conditions too dry for trees to grow. The tree cover is generally sparse, with eastern redcedar (*Juniperus virginiana*), white ash (*Fraxinus americana*), and chinkapin oak (*Quercus muhlenbergii*) scattered throughout. The shrub layer is equally sparse, and includes common hackberry (*Celtis occidentalis*), alternateleaf dogwood (*Cornus alternifolia*), American witch hazel (*Hamamelis virginiana*) and small trees. The herbaceous layer is very diverse, dominated by three conspicuous grasses: little bluestem (*Schizachyrium scoparium*), sideoats grama (*Bouteloua curtipendula*), and rock muhly (*Muhlenbergia sobolifera*). Numerous herbs complete the ground cover, and include tall thimbleweed (*Anemone virginiana*), Michaux's stitchwort (*Minuartia michauxii* var. *michauxii*), roundleaf ragwort (*Packera obovata*), bristleleaf sedge (*Carex eburnea*), prairie goldenrod (*Oligoneuron album*), woodland sunflower (*Helianthus divaricatus*), hoary mountainmint (*Pycnanthemum incanum*), and many others.

Extent in Connecticut — western marble valleys

Example — no examples with public access

Basis for description — field descriptions

NatureServe cross-reference — *Juniperus virginiana* / *Bouteloua curtipendula* - *Carex eburnea* Wooded Herbaceous Vegetation (CEGL006047)

American beachgrass (*Ammophila breviligulata*) medium-tall grasslands

Coastal sand dunes are aeolian sand deposits. Dunes on the Connecticut coast are not well developed due to the protection from direct storms provided by the landmass of Long Island. In this regard, only primary dunes generally less than six feet above high tide are formed in Connecticut. Such aeolian deposits may also form sand flats leeward of the dunes. The resultant substrate is excessively well drained and soil moisture is very dry.

As along most of the northern Atlantic Coast, the dominant plant of Connecticut's coastal dunes is American beachgrass (*Ammophila breviligulata*). The rhizomes of this plant help to stabilize the dunes. Other characteristic species include beach pea (*Lathyrus japonicus*), seaside goldenrod (*Solidago sempervirens*), beach pinweed (*Lechea maritima*), and Canada germander (*Teucrium canadense*). Saltmeadow cordgrass (*Spartina patens*) can be a common, although unexpected, component on dune slopes. In Fairfield County, bitter panicgrass (*Panicum amarum*) is a rare, but regular component. American beachgrass dunes are often interspersed with Northern bayberry – Beachplum shrub thickets. Species diversity increases landward with increased substrate stability and diminishing salt spray.

Extent in Connecticut — coastal Connecticut

Examples — Griswold Point, Old Lyme (TNC); Milford Point, Milford (Stewart B. McKinney National Wildlife Refuge)

Basis for description — Nichols (1920), Rozsa (unpublished report), field observations

NatureServe cross-reference — *Ammophila breviligulata* - *Lathyrus japonicus* Herbaceous Vegetation (CEGL006274)

Switchgrass (*Panicum virgatum*) medium-tall grasslands

This community occurs on the upland borders of salt marshes. It generally occurs as a linear feature transitional from the Saltmeadow cordgrass – Spikegrass community to the adjacent upland. The soils are generally moist, depending on the amount of

HERBACEOUS VEGETATION

seepage from the upland areas. Associated plants include saltmeadow cordgrass (*Spartina patens*), rushes (*Juncus* spp.), goldenrods/goldentops (*Solidago canadensis*, *S. sempervirens*, *Euthamia graminifolia*), eastern poison ivy (*Toxicodendron radicans*), and others.

Extent in Connecticut — coastal Connecticut

Example — Barn Island Wildlife Area, Stonington

Basis for description — Chapman (1940, 1960), Hill and Shearin (1970), Miller and Egler (1950), Nichols (1920), Niering and Warren (1980), Nixon (1982), Redfield (1972), Rozsa (unpublished report), Teal (1986), Tiner (1974)

NatureServe cross-reference — *Panicum virgatum* - *Spartina patens* Herbaceous Vegetation (CEGL006150)

Reed canarygrass (*Phalaris arundinacea*) temporarily flooded grasslands

Reed canarygrass (*Phalaris arundinacea*) can form nearly monospecific stands in shallow marshes, pond shores, and wet meadows. The soils are generally poorly drained loams that are seasonally or temporarily flooded. Reed canarygrass communities are generally intermixed with a variety of other plants, the species composition dependent on the geographic location and ecological conditions of the surrounding sites. In some locations, reed canarygrass is considered somewhat invasive, quickly dominating areas of open and/or disturbed soils, particularly when planted for soil stabilization.

Extent in Connecticut — throughout Connecticut

Example — Wangunk Meadows Wildlife Area, Portland

Basis for description — field observations

NatureServe cross-reference — *Calamagrostis canadensis* - *Phalaris arundinacea* Herbaceous Vegetation (CEGL005174), *Phalaris arundinacea* Eastern Herbaceous Vegetation (CEGL006044)

Common reed (*Phragmites australis*) temporarily flooded grasslands

Common reed (*Phragmites australis*) has broad ecological amplitude and may occupy different habitat types in both brackish and fresh waters.

Common reed occurs in both tidal and non-tidal herbaceous zones. Common reed's aggressive growth form often displaces other vegetation types, particularly on the upland borders of salt marshes and brackish tidal marshes with tidal restrictions. Under similar elevational and salinity conditions to those under which the Narrowleaf cattail – Rosemallow community develops, common reed (*Phragmites australis*) often forms large monospecific stands. Other species that may occur with common reed in brackish wetlands are narrowleaf cattail (*Typha angustifolia*), rosemallow (*Hibiscus moscheutos*), switchgrass (*Panicum virgatum*), climbing hempweed (*Mikania scandens*), and big cordgrass (*Spartina cynosuroides*).

In freshwater conditions, common reed dominates other wetland plants, sometimes encroaching into adjacent upland sites. Here, numerous herbaceous plants can be intermixed, with the species composition dependent on site conditions.

Extent in Connecticut — coastal Connecticut, scattered inland

Example — Ragged Rock Creek Wildlife Area, Old Saybrook

Basis for description — Barrett (1989), field observations

NatureServe cross-reference — *Phragmites australis* Tidal Herbaceous Vegetation (CEGL004187)

Big bluestem (*Andropogon gerardi*) temporarily flooded grasslands

Big bluestem - Bluebell bellflower (*Andropogon gerardii* - *Campanula rotundifolia*) community

This grassland community occurs on riverside rock outcrops that are flood-scoured during high-water conditions. Upland seepage discharge areas are absent or scattered. The vegetation typically grades from a dry condition higher on the bank to moist, fairly enriched conditions along the river's edge. Ice scour can occur during winter and early spring floods. These communities are also prone to severe summer drought that may stress or kill some vegetation, particularly woody plants. Within this habitat, the vegetation occurs as patches, probably due to microsite conditions. The floristic composition is variable, with characteristic species including big bluestem (*Andropogon gerardii*), little

HERBACEOUS VEGETATION

bluestem (*Schizachyrium scoparium*), Indiangrass (*Sorghastrum nutans*), bluebell bellflower (*Campanula rotundifolia*), gray goldenrod (*Solidago nemoralis*), and others. In some occurrences, shrubs such as alders (*Alnus* spp.), willows (*Salix* spp.), shrubby cinquefoil (*Dasiphora floribunda*), and small trees can occur.

Extent in Connecticut — rare in western Connecticut

Example — no examples with public access

Basis for description — field descriptions

NatureServe cross-reference — *Andropogon gerardii* - *Campanula rotundifolia* - *Solidago simplex* Herbaceous Vegetation (CEGL006284)

Bluejoint (*Calamagrostis canadensis*) temporarily flooded grasslands

Bluejoint – Bog white violet (*Calamagrostis canadensis* - *Viola lanceolata*) community

This variable, drawdown pond community is flooded only during the highest flood stages. The substrate is sand or peaty sand. The soil moisture regime is somewhat wet to wet. The extent of this community depends on basin depth, and may dominate the entire pond basin if the bottom is sufficiently shallow. Characteristic species include bluejoint (*Calamagrostis canadensis*), bog white violet (*Viola lanceolata*), and drumheads (*Polygala cruciata*).

Extent in Connecticut — central and eastern Connecticut

Example — Massacoe State Forest (Great Pond), Simsbury

Basis for description — Sneddon and Metzler (1991), field descriptions

NatureServe cross-reference — *Calamagrostis canadensis* - *Dichanthelium meridionale* Herbaceous Vegetation (CEGL006243)

Twisted sedge (*Carex torta*) temporarily flooded grasslands

Twisted sedge dominated vegetation occurs in a linear band on the banks of small streams and rivers with medium to high gradients. Light-

requiring, tough-rooted herbaceous perennials tolerant of frequent inundation and flood scouring characterize this association. Twisted sedge often forms dense, extensive colonies. Associated species vary with geography. These include: swamp verbena (*Verbena hastata*), asters (*Symphotrichum puniceum*, *Doellingeria umbellata*), goldenrods (*Solidago rugosa*, *S. canadensis*), bulrushes (*Scirpus expansus*, *S. cyperinus*), field horsetail (*Equisetum arvense*), eastern marsh fern (*Thelypteris palustris*), sensitive fern (*Onoclea sensibilis*), New York ironweed (*Vernonia noveboracensis*), Virginia water horehound (*Lycopus virginicus*), blue skullcap (*Scutellaria lateriflora*), alders (*Alnus* spp.), and several willows (*Salix* spp.).

Extent in Connecticut — along many high to medium gradient streams

Example — Sandy Brook Natural Area Preserve, Colebrook

Basis for description — field observations

NatureServe cross-reference — *Carex torta* – *Apocynum cannabinum* Herbaceous Vegetation (CEGL006536)

Tussock sedge (*Carex stricta*) seasonally flooded grasslands

This community generally occurs in wet meadows, often grazed or recently abandoned from grazing. Tussock sedge (*Carex stricta*) is the most conspicuous species, occurring as low tussocks interspersed with areas of open water or mud, depending on recent precipitation. This community floods in the winter and after rains, with standing water persisting throughout the growing season in most years. A number of other plants occur on the tussocks, including red maple (*Acer rubrum*) seedlings and saplings and a number of characteristic wetland herbs, including pale jewelweed (*Impatiens capensis*), eastern marsh fern (*Thelypteris palustris*), thoroughwort (*Eupatorium* spp.), bedstraw (*Galium* spp.), and others. Tussock sedge communities are transitional to red maple woodlands over time.

Extent in Connecticut — throughout Connecticut

Example — Park River flood-control sites, Bloomfield

Basis for description — field descriptions

HERBACEOUS VEGETATION

NatureServe cross-reference — *Carex stricta* - *Carex vesicaria* Seasonally Flooded Herbaceous Vegetation (CEGL006412)

Hairy sedge – Cattail (*Carex lacustris* / *Typha* spp.) seasonally flooded grasslands

This graminoid-dominated vegetation occurs in areas with calcareous bedrock. The soil is peat and/or muck, with depth of the organic horizon greater than two meters. The community undergoes regular inundation, with summer water table ranging from just above to just below the surface. The soil moisture regime varies from wet to very wet. This limestone fen community is characterized and dominated by hairy sedge (*Carex lacustris*). Shrub cover is generally low, but may include red maple (*Acer rubrum*), shrubby cinquefoil (*Dasiphora floribunda*), willows (*Salix* spp.), and bog birch (*Betula pumila*). In addition to hairy sedge, herbaceous species frequently include cattails (*Typha* spp.), tussock sedge (*Carex stricta*) and eastern marsh fern (*Thelypteris palustris*).

Extent in Connecticut — western marble valleys

Example — Beeslick Pond, Salisbury (TNC)

Basis for description — Motzkin (1992)

NatureServe cross-reference — *Betula pumila* - *Toxicodendron vernix* - *Dasiphora fruticosa* ssp. *floribunda* Shrubland (CEGL006360)

Woollyfruit sedge (*Carex lasiocarpa*) saturated grasslands

Woollyfruit sedge – Water sedge (*Carex lasiocarpa* - *Carex aquatilis* var. *aquatilis*) community

This fen community occurs in saturated soils derived from limestone bedrock with deep surface deposits of peat and/or muck. These areas undergo regular inundation, and the soil moisture regime ranges from wet to very wet. This community is characterized by sedges (*Carex lasiocarpa* and/or *C. aquatilis*), shrubby cinquefoil (*Dasiphora floribunda*), and sweetgale (*Myrica gale*). In general, shrubby species occur in scattered patches. Such species may include bog birch (*Betula pumila*), red maple (*Acer rubrum*), meadowsweet (*Spiraea alba* var. *latifolia*), willows (*Salix candida*, *S. lucida*, *S. discolor*, *S. serissima*), redosier dogwood (*Cornus sericea*), poison sumac (*Toxicodendron vernix*), and alder (*Alnus* spp.). In addition to the characteristic

sedges, herbaceous species may include cattails (*Typha* spp.), sedges (*Carex diandra*, *C. prairea*, *C. stricta*), twigrush (*Cladium mariscoides*), and bladderwort species (*Utricularia* spp.). Mosses such as *Campylium stellatum* and *Calliergonella* spp. are often dominant.

Extent in Connecticut — western marble valleys

Example — Beeslick Pond, Salisbury (TNC)

Basis for description — Motzkin (1992)

NatureServe cross-reference — (*Myrica gale* - *Dasiphora fruticosa* ssp. *floribunda*) / *Carex lasiocarpa* - *Cladium mariscoides* Shrub Herbaceous Vegetation (CEGL006068)

Woollyfruit sedge / Leatherleaf (*Carex lasiocarpa* / *Chamaedaphne calyculata*) community

This fen community is sedge-dominated with scattered patches of shrubs. The soils are primarily acidic, saturated peats with areas of localized water movement. Characteristic shrubs include leatherleaf (*Chamaedaphne calyculata*), sweetgale (*Myrica gale*), and steeplebush (*Spiraea tomentosa*). In addition to woollyfruit sedge (*Carex lasiocarpa*), which often dominates, twigrush (*Cladium mariscoides*) and tussock sedge (*Carex stricta*) are common. Cranberry (*Vaccinium macrocarpon*) often covers large areas. Dominant mosses include *Sphagnum subsecundum*, *Sphagnum teres*, or *Calliergonella cuspidata*.

Extent in Connecticut — northern and eastern Connecticut

Example — Pachaug State Forest, Voluntown

Basis for description — field descriptions

NatureServe cross-reference — *Myrica gale* - *Chamaedaphne calyculata* / *Carex (lasiocarpa, utriculata)* - *Utricularia* spp. Shrub Herbaceous Vegetation (CEGL006302)

Twigrush (*Cladium mariscoides*) saturated grasslands

Twigrush – White beaksedge (*Cladium mariscoides* - *Rhynchospora alba*) community

This fen community occurs on both acidic and calcareous-influenced peats where mosses (e.g.,

HERBACEOUS VEGETATION

Sphagnum warnstorffii, *S. fimbriatum*, and other *Sphagnum* species) accumulate. Sedges predominate, including: twigrush (*Cladium mariscoides*), woollyfruit sedge (*Carex lasiocarpa*), and white beaksedge (*Rhynchospora alba*). Dwarf shrubs can be scattered, including sweetgale (*Myrica gale*), bog rosemary (*Andromeda polifolia* var. *glaucophylla*), and leatherleaf (*Chamaedaphne calyculata*). In calcareous areas, shrubby cinquefoil (*Dasiphora floribunda*) and the mosses *Campylium stellatum* and *Calliergonella* spp. can be conspicuous. Other common plants are rose pogonia (*Pogonia ophioglossoides*), purple pitcherplant (*Sarracenia purpurea*), bog buckbean (*Menyanthes trifoliata*), sundew (*Drosera rotundifolia*), bladderworts (*Utricularia intermedia*, *U. gibba*), and cranberry (*Vaccinium macrocarpon*).

Extent in Connecticut — northwest marble valleys

Example — Beeslick Pond, Salisbury (TNC)

Basis for description — field descriptions

NatureServe cross-reference — none

Twigrush – Meager sedge (*Cladium mariscoides* - *Carex exilis*) community

This fen community is known from a single recently found occurrence in southeastern Connecticut, related to similar occurrences in Rhode Island. The substrate is wet peat, often flooded during periods of high water. Sedges are the dominant plants, with twigrush (*Cladium mariscoides*) and meager sedge (*Carex exilis*) the most conspicuous. Other characteristic species include beaksedges (*Rhynchospora alba*, *R. capitellata*), sedges (*Carex lasiocarpa*, *C. stricta*), spikerush (*Eleocharis tuberculosa*), Canadian rush (*Juncus canadensis*), Virginia marsh St. Johnswort (*Triadenum virginicum*), and bladderworts (*Utricularia* spp.). Scattered shrubs, e.g., speckled alder (*Alnus incana* ssp. *rugosa*) and meadowsweet (*Spiraea alba* var. *latifolia*) occur, especially on the upland borders. Various peat mosses (*Sphagnum* spp.) form a loose, unconsolidated mat.

Extent in Connecticut — rare in Connecticut

Example — no examples with public access

Basis for description — field descriptions

NatureServe cross-reference — *Myrica gale* -

Chamaedaphne calyculata / *Carex exilis* Shrub Herbaceous Vegetation (CEGL006392)

Twigrush – Spoonleaf sundew – Beaked spikerush (*Cladium mariscoides* - *Drosera intermedia* - *Eleocharis rostellata*) community

This rare association is best known as a “sea-level fen,” the name based on the occurrence of the vegetation type at the interface of an upland groundwater discharge site and an estuarine marsh. This community develops where freshwater seepage provides the hydrologic conditions necessary for an open fen to develop, occurring adjacent and transitional to brackish and/or salt marsh vegetation. Regularly occurring herbaceous plants include: twigrush (*Cladium mariscoides*), sedges (*Carex hormanthoides*, *C. howei*, *C. atlantica*), spikerushes (*Eleocharis rostellata*, *E. fallax*), rushes (*Juncus canadensis*, *J. pelocarpus*), beaksedges (*Rhynchospora alba*, *R. capitellata*), bulrushes (*Schoenoplectus americanus*, *S. pungens*), sundews (*Drosera intermedia*, *D. rotundifolia*), and a variety of fall composites including New York aster (*Symphotrichum novi-belgii*) and seaside goldenrod (*Solidago sempervirens*). Scattered shrubs include northern bayberry (*Morella pensylvanica*) and meadowsweet (*Spiraea latifolia*). The moss layer is moderately conspicuous, including a number of peat mosses (*Sphagnum lescurii*, *S. palustre*, and, rarely, *S. cyclophyllum*).

Extent in Connecticut — southeastern coastal Connecticut

Example — Barn Island Wildlife Management Area, Stonington

Basis for description — Ludwig (1995), field descriptions

NatureServe cross-reference — *Cladium mariscoides* - *Drosera intermedia* - *Eleocharis rostellata* Herbaceous Vegetation (CEGL006310)

Inland sedge – Bristlystalked sedge – Yellow sedge (*Carex interior* - *Carex leptalea* - *Carex flava*) saturated grasslands

Dioecious sedge / Shrubby cinquefoil (*Carex sterilis* / *Dasiphora floribunda*) community

This community occurs in areas with limestone bedrock, and the soil may be a silt loam. Depth to the water table ranges from the surface to just below.

HERBACEOUS VEGETATION

The soil moisture regime is wet. Trees and shrubs are sparse but characteristic, with eastern white pine (*Pinus strobus*), tamarack (*Larix laricina*), shrubby cinquefoil (*Dasiphora floribunda*), autumn willow (*Salix serissima*), currant species (*Ribes* spp.), and alderleaf buckthorn (*Rhamnus alnifolia*) usually present. The herbaceous layer is dominated by sedges (*Carex interior*, *C. sterilis*, *C. leptalea*, *C. flava*, *C. hystericina*). Other characteristic herbaceous species include fen grass of Parnassus (*Parnassia glauca*), squarestem goldenrod (*Solidago patula*), bog goldenrod (*Solidago uliginosa*), and eastern marsh fern (*Thelypteris palustris*). Several species of horsetail (*Equisetum* spp.) also may be present. Characteristic mosses include *Campylium stellatum*, *Limprichtia revolvens*, *Scorpidium scorpioides*, and several species of *Sphagnum*.

Extent in Connecticut — western marble valleys

Example — Benton Hill fen, Sharon (TNC)

Basis for description — Motzkin (1992), field descriptions

NatureServe cross-reference — *Dasiphora fruticosa* ssp. *floribunda* / *Carex* (*sterilis*, *hystericina*, *flava*) Shrub Herbaceous Vegetation (CEGL006326)

Dioecious sedge / Gray dogwood (*Carex sterilis* / *Cornus racemosa*) community

This community occurs on calcareous groundwater-discharge areas in northwestern Connecticut. Sites generally have a gentle slope, with shallow organic layers formed over calcareous glacial tills. Characteristic herbs include numerous sedges (*Carex aquatilis*, *C. flava*, *C. hystericina*, *C. interior*, *C. leptalea*, *C. lacustris*, *C. sterilis*, *Eriophorum viridi-carinatum*) and spiked muhly (*Muhlenbergia glomerata*). The shrub diversity is a conspicuous component of this community and distinguishes this type from the Dioecious sedge / Shrubby cinquefoil community described above. Shrubs include silky dogwood (*Cornus amomum*), redosier dogwood (*Cornus sericea*), alderleaf buckthorn (*Rhamnus alnifolia*), hairy gooseberry (*Ribes hirtellum*), common serviceberry (*Amelanchier arborea*), and highbush blueberry (*Vaccinium corymbosum*). Characteristic mosses include *Campylium stellatum*, *Limprichtia revolvens*, *Scorpidium scorpioides*, and several species of *Sphagnum*.

Extent in Connecticut — western marble valleys

Example — Benton Hill fen, Sharon (TNC)

Basis for description — Motzkin (1992), field descriptions

NatureServe cross-reference — *Cornus racemosa* / *Carex* (*sterilis*, *hystericina*, *flava*) Shrub Herbaceous Vegetation (CEGL006123)

White beaksedge (*Rhynchospora alba*) saturated grasslands

White beaksedge / Sphagnum moss (*Rhynchospora alba* / *Sphagnum cuspidatum*) community

This herbaceous community occurs along pool margins and wet depressions in bogs. The soil is peat, and the soil moisture regime varies from wet to very wet. Herbaceous cover can be variable, depending on the size of the occurrence and the wetness of the peat. The dominant herbaceous species are few, including white beaksedge (*Rhynchospora alba*) and horned bladderwort (*Utricularia cornuta*). Dwarf shrubs such as cranberry (*Vaccinium macrocarpon*) and leatherleaf (*Chamaedaphne calyculata*) can sporadically occur. Mosses generally form a carpet, dominated by Sphagnum moss (e.g., *Sphagnum cuspidatum*). In very wet areas, a liverwort, *Cladopodiella fluitans*, can be dominant.

Extent in Connecticut — northern Connecticut

Example — no examples with public access

Basis for description — Damman and French (1987), Perry (1987)

NatureServe cross-reference — *Sphagnum* (*rubellum*, *cuspidatum*, *torreyanum*) - *Vaccinium* (*oxycoccus*, *macrocarpon*) Nonvascular Vegetation (CEGL006394)

Broadleaf cattail (*Typha latifolia*) semipermanently flooded grasslands

Occurring in shallow ponds, shallow lakeshores and coves, and marshes, cattail (*Typha latifolia*) can form monotypic stands or grow in association with a number of other plants. Associate species vary from site to site, reflecting different geographic and ecological conditions, but generally include various sedges (*Scirpus* spp., *Carex* spp.), forbs, and ferns, e.g., eastern marsh fern (*Thelypteris palustris*). Cattail marshes occur in semipermanently flooded conditions where the substrate is exposed during

HERBACEOUS VEGETATION

periods of prolonged drought. Generally, water depth is one to two feet. Cattail is a very prolific seed producer and can rapidly colonize areas recently exposed by natural or man-induced drawdowns.

Extent in Connecticut — throughout Connecticut

Example — Nachaug State Forest, Chaplin

Basis for description — field descriptions

NatureServe cross-reference — *Typha* (*angustifolia*, *latifolia*) - (*Schoenoplectus* spp.) Herbaceous Vegetation (CEGL006153)

Threeway sedge (*Dulichium arundinacea*) semipermanently flooded grasslands

Threeway sedge / Sphagnum moss (*Dulichium arundinacea* / *Sphagnum* spp.) community

This vegetation type occurs as a narrow zone in semipermanently flooded or saturated conditions on pond and bog borders and other areas where minerotrophic conditions exist. Associated species vary, depending on ecologic and geographic conditions, but often include rushes (*Juncus pelocarpus* and others), sedges (*Carex stricta*, *C. lasiocarpa*, *C. utriculata* var. *rostrata*, *C. canescens*), and scattered flowering herbs (e.g., *Bidens* spp.). One of several Sphagnum mosses (*Sphagnum cuspidatum*, *S. papillosum*, *S. torreyanum*) generally forms a continuous carpet.

Extent in Connecticut — northern and eastern Connecticut

Example — Flander's Nature Center, Woodbury

Basis for description — Lundgren (1999), Perry (1987)

NatureServe cross-reference — *Dulichium arundinaceum* / *Sphagnum* spp. Herbaceous Vegetation (CEGL006131)

Threeway sedge – Swamp-candles (*Dulichium arundinaceum* – *Lysimachia terrestris*) community

This community occurs on sandy pondshores and in shallow, sandy basins that are exposed during periods of low water. This vegetation type occurs either as a linear shoreline feature of variable width on ponds that have a permanent central water body without emergent vegetation, or in shallow basins

that support emergent vegetation across the entire surface. Substrate is muck, sand, or mucky sand with an organic layer of variable depth. Species composition is variable, but usually includes the following: common meadowbeauty (*Rhexia virginica*), swamp-candles (*Lysimachia terrestris*), big muhly (*Muhlenbergia uniflora*), golden hedgehyssop (*Gratiola aurea*), slender goldentop (*Euthamia tenuifolia*), northern water horehound (*Lycopus uniflorus*), bog white violet (*Viola lanceolata*), brownfruit rush (*Juncus pelocarpus*), and threeway sedge (*Dulichium arundinaceum*).

Extent in Connecticut — central and eastern Connecticut

Example — Uncas Pond, Lyme (Nehantic State Forest)

Basis for description — field observations

NatureServe cross-reference — *Lysimachia terrestris* - *Dulichium arundinaceum* - *Rhexia virginica* Herbaceous Vegetation (CEGL006035)

Hardstem bulrush (*Schoenoplectus acutus*) semipermanently flooded grasslands

This community occurs in shallow standing water on the borders of calcareous lakes and ponds. This vegetation type generally occurs as a linear shoreline feature on the border between open water and calcareous fens, or less regularly on the borders of upland shorelines. Substrate is muck or marl with an organic layer of variable depth. This association is dominated by hardstem bulrush (*Schoenoplectus acutus*) with scattered patches of other plants such as woollyfruit sedge (*Carex lasiocarpa*), narrowleaf cattail (*Typha angustifolia*), and softstem bulrush (*Schoenoplectus tabernaemontani*). Aquatic plants such as bladderworts (*Utricularia minor*, *Utricularia intermedia*), pondweeds (*Potamogeton* spp.), and Beck's watermarigold (*Megalodonta beckii*) can often be found stranded among the bulrushes and cattails.

Extent in Connecticut — western marble valleys

Example — Beeslick Pond, Salisbury (TNC)

Basis for description — Motzkin (1992), Field descriptions

NatureServe cross-reference — *Schoenoplectus acutus* - *Carex lasiocarpa* Herbaceous Vegetation (CEGL006358)

HERBACEOUS VEGETATION

Smooth cordgrass (*Spartina alterniflora*) tidally flooded grasslands

Smooth cordgrass (*Spartina alterniflora*) community

This community occurs on the low marsh portions of saline marshes and on creek borders. The low marsh is the area characterized by regular flooding of semidiurnal tides. Salt marsh soils are composed mainly of mucky silt to silty coarse fibrous peat. These soils often contain high amounts of organic matter. The area is characterized by monospecific stands of the tall form of smooth cordgrass, with the height of the stems corresponding to the increase in tidal amplitude in Long Island Sound from east to west. Sandspurry (*Spergularia marina*, *S. canadensis*) often occurs in areas with open peat.

Extent in Connecticut — coastal Connecticut

Example — Charles E. Wheeler Wildlife Area, Milford

Basis for description — Barrett (1989), Chapman (1940, 1960), Hill and Shearin (1970), Miller and Egler (1950), Niering and Warren (1980), Nixon (1982), Redfield (1972), Teal (1986), Tiner (1974)

NatureServe cross-reference — *Spartina alterniflora* / (*Ascophyllum nodosum*) Acadian/Virginian Zone Herbaceous Vegetation (CEGL004192)

Smooth cordgrass – Eastern lilaopsis (*Spartina alterniflora* - *Lilaeopsis chinensis*) community

A different association dominated by smooth cordgrass occurs as a low marsh border under brackish conditions. While smooth cordgrass forms dense stands similar to those that occur in regularly flooded salt marshes, this brackish association is differentiated by the dense carpets of spikerush (*Eleocharis parvula*) and eastern lilaopsis (*Lilaeopsis chinensis*) that often form under the cordgrass. The presence of big cordgrass (*Spartina cynosuroides*) and mudwort (*Limosella subulata*) are also characteristic. This midtidal brackish marsh is a good indicator of the summer salinity conditions of the adjacent coastal waters.

Extent in Connecticut — major tidal rivers

Example — Great Island Wildlife Area, Old Lyme

Basis for description — Barrett (1989), Metzler

and Rozsa (1982)

NatureServe cross-reference — *Spartina alterniflora* - *Lilaeopsis chinensis* Herbaceous Vegetation (CEGL004193)

Common threesquare (*Schoenoplectus pungens*) tidally flooded grasslands

Common threesquare – Sturdy bulrush (*Schoenoplectus pungens* - *Schoenoplectus robustus*) community

Along the midtidal brackish marsh border, bulrushes become dominant (e.g., *Schoenoplectus pungens*, *S. robustus* and, less commonly, *Schoenoplectus novae-angliae*). With variable salinity, these areas can be intermixed with annual wildrice (*Zizania aquatica*), smooth cordgrass (*Spartina alterniflora*), and/or prairie cordgrass (*Spartina pectinata*). Also growing in this midtidal area are dotted smartweed (*Polygonum punctatum*), waterhemp (*Amaranthus cannabinus*), softstem bulrush (*Schoenoplectus tabernaemontani*), beaked spikerush (*Eleocharis rostellata*), smooth beggartick (*Bidens laevis*) and water parsnip (*Sium suave*).

Extent in Connecticut — major tidal rivers

Example — Ragged Rock Creek Marsh Wildlife Area, Old Saybrook

Basis for description — Barrett (1989), Metzler and Rozsa (1982), Nichols (1920), Odum et al. (1984), field descriptions

NatureServe cross-reference — *Schoenoplectus pungens* Tidal Herbaceous Vegetation (CEGL004188)

Common threesquare - Arrowhead (*Schoenoplectus pungens* - *Sagittaria* spp.) community

Vegetation along the shoreline of tidal rivers is often very sparse. The substrate ranges from silt to sand. Shorelines are tidally scoured as well as ice scoured during winter. Within the brackish areas of shoreline, large stands of common threesquare (*Schoenoplectus pungens*) occasionally occur. Species of arrowhead (*Sagittaria subulata*, *S. latifolia*, *S. rigida*) may sometimes grow intermixed with common threesquare.

Extent in Connecticut — major tidal rivers

HERBACEOUS VEGETATION

Example — Selden Island Natural Area Preserve, Lyme

Basis for description — Barrett (1989), field descriptions

NatureServe cross-reference — *Schoenoplectus pungens* Tidal Herbaceous Vegetation (CEGL004188)

Annual wildrice (*Zizania aquatica*) tidally flooded grasslands

Annual wildrice – Pickerelweed (*Zizania aquatica* - *Pontederia cordata*) community

The lower/midtidal flats of fresh to slightly brackish waters may be devoid of vegetation or support large stands of annual wildrice (*Zizania aquatica*) and/or pickerelweed (*Pontederia cordata*). This community has extreme seasonal variations, ranging from large areas of open mud during the winter and early spring to a 10-foot-tall dense grassland in the late summer to early fall. Other species often associated with the flats include green arrow arum (*Peltandra virginica*), arrowheads (*Sagittaria subulata*, *S. latifolia*, *S. spatulata*), common threesquare (*Schoenoplectus pungens*), marsh seedbox (*Ludwigia palustris*), and yellowseed false pimpernel (*Lindernia dubia*). Golden club (*Orontium aquaticum*) and Torrey's bulrush (*Schoenoplectus torreyi*) may be found locally. The large stands of annual wildrice are of particular importance as nesting and feeding areas for waterfowl, shorebirds and some terrestrial bird species, particularly during their fall migration.

Extent in Connecticut — major tidal rivers

Example — Whalebone Creek, Lyme (TNC)

Basis for description — Barrett (1989), Metzler and Rozsa (1982), Nichols (1920), Odum et al. (1984)

NatureServe cross-reference — *Zizania aquatica* Tidal Herbaceous Vegetation (CEGL004202)

Narrowleaf cattail (*Typha angustifolia*) tidally flooded grasslands

Narrowleaf cattail – Rosemallow (*Typha angustifolia* - *Hibiscus moscheutos*) community

This community develops at higher elevations than the Saltmarsh cordgrass – Creeping bentgrass community. As saline conditions decrease, brackish

tidal marsh species invade the meadow. Narrowleaf cattail (*Typha angustifolia*) or common reed (*Phragmites australis*) is conspicuously dominant in the transition from marsh to meadow. Either of these species may form large, impressive stands. Upriver, with greater freshwater input, brackish marshes may imperceptibly intergrade into a freshwater counterpart with the same two dominants, narrowleaf cattail or common reed. However, broadleaf cattail (*Typha latifolia*) is the more common dominant of freshwater tidal marshes.

Additional species within this community include rosemallow (*Hibiscus moscheutos*), big cordgrass (*Spartina cynosuroides*), switchgrass (*Panicum virgatum*) and climbing hempvine (*Mikania scandens*).

Extent in Connecticut — major tidal rivers

Example — Lords Cove Wildlife Area, Lyme

Basis for description — Barrett (1989), Metzler and Rozsa (1982)

NatureServe cross-reference - *Typha angustifolia* - *Hibiscus moscheutos* Herbaceous Vegetation (CEGL004201)

Sweetflag (*Acorus calamus*) tidally flooded grasslands

This midtidal marsh community is dominated by dense colonies of sweetflag (*Acorus calamus*). Other characteristic species include threeway sedge (*Dulichium arundinaceum*), devil's beggartick (*Bidens frondosa*), tussock sedge (*Carex stricta*), water horsetail (*Equisetum fluviatile*), jewelweed (*Impatiens capensis*), paleyellow iris (*Iris pseudacorus*), purple loosestrife (*Lythrum salicaria*), dotted smartweed (*Polygonum punctatum*), swamp dock (*Rumex verticillatus*), broadfruit bur-reed (*Sparganium eurycarpum*), and sometimes rice cutgrass (*Leersia oryzoides*). Annual wildrice (*Zizania aquatica*) and pickerelweed (*Pontederia cordata*), more common on the tidal flats, may also persist here. Several species of bulrush and woolgrass (*Schoenoplectus fluviatilis*, *S. tabernaemontani*, and *Scirpus cyperinus*) also occur in this midtidal zone.

Extent in Connecticut — major tidal rivers

Example — Haddam Neck Wildlife Area, East Haddam

HERBACEOUS VEGETATION

Basis for description — Barrett (1989), Metzler and Rozsa (1982), Nichols (1920), Odum, et al. (1984)

NatureServe cross-reference — *Acorus calamus* Tidal Herbaceous Vegetation (CEGL006833)

River bulrush (*Schoenoplectus fluviatilis*) tidally flooded grasslands

This vegetation cover type occurs in a variety of tidally flooded and non-tidal flooded water regimes. Its distribution ranges from regularly flooded creek borders to irregularly flooded or semipermanently flooded back marshes. In all occurrences, river bulrush (*Schoenoplectus fluviatilis*) is the dominant and most conspicuous plant. Regularly associated species include arrow arum (*Peltandra virginica*), tussock sedge (*Carex stricta*), rice cutgrass (*Leersia oryzoides*), water horsetail (*Equisetum fluviatile*), dotted smartweed (*Polygonum punctatum*), and several beggarticks (*Bidens* spp.).

Extent in Connecticut — major tidal rivers

Example — Cromwell Meadows Wildlife Area, Middletown/Cromwell

Basis for description — Barrett (1989)

NatureServe cross-reference — none

Hairy sedge (*Carex lacustris*) tidally flooded grasslands

Hairy sedge – Bluejoint – Canada wildrye (*Carex lacustris* - *Calamagrostis canadensis* - *Elymus canadensis*) community

The abundance of hairy sedge (*Carex lacustris*), as well as bluejoint (*Calamagrostis canadensis*) and Canada wildrye (*Elymus canadensis*) characterize this tidal marsh community. This community shares many species in common with the Sensitive fern – River bulrush - Cattail marsh community, as well as great ragweed (*Ambrosia trifida*), wild mint (*Mentha arvensis*), New York ironweed (*Vernonia noveboracensis*), purplestem angelica (*Angelica atropurpurea*), common boneset (*Eupatorium perfoliatum*) and reed canarygrass (*Phalaris arundinacea*).

Extent in Connecticut — major tidal rivers

Example — Selden Island Natural Area Preserve, Lyme

Basis for description — Barrett (1989)

NatureServe cross-reference — none

Saltmeadow cordgrass (*Spartina patens*) tidally flooded grasslands

Saltmeadow cordgrass – Spike-grass (*Spartina patens* - *Distichlis spicata*) community

The primary factors that determine the change in salt marsh vegetation from low to high marsh are the frequency and duration of flooding. The high saltmarsh community represents the coastal area above the mean high-tide elevation to the elevational limit of spring tides. This zone is subject to irregular flooding by spring and flood tides. Soils are similar to those of the Smooth cordgrass community.

Saltmeadow cordgrass (*Spartina patens*) forms dense, pure swards. Other salt-tolerant species often found in the high marsh include spike-grass (*Distichlis spicata*) and, at higher elevations or well-drained levees, black grass (*Juncus gerardii*). Areas dominated by the latter are often referred to as the black grass variant of this community. Other plant species less commonly found in the high marsh include bushy knotweed (*Polygonum ramosissimum*), seaside goldenrod (*Solidago sempervirens*), spear saltbush (*Atriplex patula*), perennial saltmarsh aster (*Symphyotrichum undulatum*), eastern annual saltmarsh aster (*Symphyotrichum subulatum*) and tidalmarsh amaranth (*Amaranthus cannabinus*). Many birds feed and nest in the high salt marsh community.

Extent in Connecticut — coastal Connecticut

Example — Hammonasset Natural Area Preserve, Clinton

Basis for description — Barrett (1989), Chapman (1940, 1960), Miller and Egler (1950), Niering and Warren (1980), Nixon (1982), Redfield (1972), Teal (1986), Tiner (1974)

NatureServe cross-reference — *Spartina patens* - *Distichlis spicata* - (*Juncus gerardii*) Herbaceous Vegetation (CEGL006006)

Saltmeadow cordgrass – Creeping bentgrass (*Spartina patens* - *Agrostis stolonifera*) community

Brackish meadows occur under similar elevational conditions as salt meadows. However, due to

HERBACEOUS VEGETATION

increasing freshwater input, the waters influencing the meadows are classified as brackish. These meadows are subject to irregular flooding as described for the Saltmeadow cordgrass – Spikegrass community. Soil characteristics of brackish wetlands are intermediate in range between those of salt marshes and tidal freshwater wetlands. Organic-matter content of the soils may be less than that found in salt marshes.

Structurally, brackish meadows are very similar to the salt marshes. Saltmeadow cordgrass (*Spartina patens*) is usually dominant, and other species also associated with salt marshes include black grass (*Juncus gerardii*), seaside arrowgrass (*Triglochin maritimum*), seaside goldenrod (*Solidago sempervirens*), and silverweed cinquefoil (*Argentina anserina*). Species more characteristic of the tidal brackish meadow are creeping bentgrass (*Agrostis stolonifera*), marsh straw sedge (*Carex hormathodes*), red fescue (*Festuca rubra*), common spikerush (*Eleocharis palustris*), herbwilliam (*Ptilimnium capillaceum*), and the bulrushes *Schoenoplectus pungens* and *S. americanus*.

Extent in Connecticut — lower Connecticut River

Example — Ragged Rock Creek Marsh Wildlife Area, Old Saybrook

Basis for description — Barrett (1989), Metzler and Rozsa (1982), Nichols (1920)

NatureServe cross-reference — *Spartina patens* - *Agrostis stolonifera* Herbaceous Vegetation (CEGL006365)

HERBACEOUS FORB VEGETATION

(Forbs, including ferns and biennials, generally contribute to greater than 50% of total herbaceous cover.)

Seaside threeawn – Field sagewort (*Aristida tuberculosa* - *Artemisia campestris* ssp. *caudata*) forb vegetation

This herbaceous sand flat vegetation occurs on stable inner coastal dunes. It is generally a variable mosaic of herb and grass species. Seaside threeawn (*Aristida tuberculosa*) and field sagewort (*Artemisia campestris* ssp. *caudata*) are characteristic. Common associates include New England blazing star (*Liatris scariosa* var. *novae angliae*), beach pinweed (*Lechea maritima*), saltmeadow cordgrass

(*Spartina patens*), purple lovegrass (*Eragrostis spectabilis*), seaside goldenrod (*Solidago sempervirens*), and Eastern prickly pear (*Opuntia humifusa* var. *humifusa*). Other plants indicative of open sands include Gray's flatsedge (*Cyperus grayi*), beach sedge (*Carex silicea*), northern evening-primrose (*Oenothera parviflora*), purple sandgrass (*Triplasis purpurea*), and forked bluecurls (*Trichostema dichotoma*). In some occurrences, natural and man-induced disturbance encourages the proliferation of non-native invasive plants.

Extent in Connecticut — rare in coastal Fairfield County

Example — no examples with public access

Basis for description — Rozsa (unpublished report), field descriptions

NatureServe cross-reference — (*Morella pensylvanica*) / *Schizachyrium littorale* – *Aristida tuberculosa* Shrub Herbaceous Vegetation (CEGL006161)

America golden saxifrage (*Chrysosplenium americanum*) saturated forb vegetation

This type includes small open or forested groundwater seeps dominated by American golden saxifrage (*Chrysosplenium americanum*). Other herbaceous plants are scattered, including Pennsylvania bittercress (*Cardamine pensylvanica*), small enchanter's nightshade (*Circaea alpina*), marsh blue violet (*Viola cucullata*), white turtlehead (*Chelone glabra*), melic mannagrass (*Glyceria melicaria*), fowl mannagrass (*Glyceria striata*), sweet woodreed (*Cinna arundinacea*), jewelweed (*Impatiens capensis*), eastern rough sedge (*Carex scabrata*), Allegheny monkeyflower (*Mimulus ringens*), and the moss *Rhizomnium punctatum*. Typically the community is over-shaded by trees from the surrounding upland that are rooted in adjacent drier soils.

Extent in Connecticut — throughout Connecticut

Example — Kollar Wildlife Area, Tolland

Basis for description — field descriptions

NatureServe cross-reference — *Chrysosplenium americanum* Herbaceous Vegetation (CEGL006193)

Green arrow arum – Lizard's tail (*Peltandra*

HERBACEOUS VEGETATION

virginica - *Saururus cernuus*) semipermanently flooded forb vegetation

This herbaceous wetland occupies depressions and swales adjacent to streams and on floodplains on a few small rivers in Fairfield County that pond water for all or much of the year. Water is supplied by both upland runoff and by flood events. The vegetative cover in these swales can be quite variable, depending on water depth. Vegetation may be confined to edges or shallower portions that dry out during the growing season. In most occurrences, lizard's tail (*Saururus cernuus*) is dominant. Associated species include green arrow arum (*Peltandra virginica*), pickerelweed (*Pontederia cordata*), royal fern (*Osmunda regalis*), smartweeds (*Polygonum amphibium*, *P. hydropiperoides*), sedges (*Carex crinita*, *C. lupulina*), and the moss *Climacium americanum*. Larger occurrences often contain floating-leaved aquatic species such as watershield (*Brasenia schreberi*) and American white waterlily (*Nymphaea odorata*). Scattered shrubs can occur as patches, and include species such as alder (*Alnus* spp.), winterberry (*Ilex verticillata*), silky dogwood (*Cornus amomum*) and/or common buttonbush (*Cephalanthus occidentalis*). In some areas, purple loosestrife (*Lythrum salicaria*) is becoming increasingly abundant.

Extent in Connecticut — rare in Fairfield County

Example — Saugatuck Falls Natural Area, Redding

Basis for description — field observations

NatureServe cross-reference — *Peltandra virginica* - *Saururus cernuus* - *Carex crinita* / *Climacium americanum* Herbaceous Vegetation (CEGL007696)

Pickerelweed – Green arrow arum (*Pontederia cordata* - *Peltandra virginica*) semipermanently flooded forb vegetation

This herbaceous wetland occurs in shallow water of varying depths along river shores and in ponds, lakes, and impoundments. Pickerelweed (*Pontederia cordata*) and green arrow arum (*Peltandra virginica*) are common and conspicuous. Associated plants may include bulrushes (*Schoenoplectus tabernaemontani*, *S. pungens*, *S. fluviatilis*), rice cutgrass (*Leersia oryzoides*), bur-reeds (*Sparganium* spp.), smartweeds (*Polygonum hydropiperoides*, *P. punctatum*), broadleaf arrowhead (*Sagittaria latifolia*), and occasionally annual wildrice (*Zizania*

aquatica). In deeper water, variegated yellow pond-lily (*Nuphar lutea* ssp. *variegata*) and/or American white waterlily (*Nymphaea odorata*) may also occur.

Extent in Connecticut — throughout Connecticut

Example — Assekonk Swamp Wildlife Area, North Stonington

Basis for description — field observations

NatureServe cross-reference — *Pontederia cordata* - *Sagittaria latifolia* Herbaceous Vegetation (CEGL006191)

Common meadowbeauty (*Rhexia virginica*) intermittently exposed forb vegetation

Common meadowbeauty – Golden hedgehyssop (*Rhexia virginica* - *Gratiola aurea*) community

This highly variable community is represented only by depauperate examples in Connecticut. Ponds with coastal-plain flora range from Nova Scotia to Florida, such that the flora varies not only with the size and condition of the occurrence, but geographic location as well. Floristic composition varies from year to year, highly dependent on precipitation. Dominant, characteristic species of this drawdown community in Connecticut include common meadowbeauty (*Rhexia virginica*), golden hedgehyssop (*Gratiola aurea*) and yellowseed false pimpernel (*Lindernia dubia*). Other characteristic species include spoonleaf sundew (*Drosera intermedia*), brownfruit rush (*Juncus pelocarpus*), bog yelloweyed grass (*Xyris difformis*), bog white violet (*Viola lanceolata*), and bright green spikerush (*Eleocharis olivacea*).

Extent in Connecticut — central and eastern Connecticut

Example — Great Pond, Glastonbury

Basis for description — LeBlond (1991), Schneider and Zaremba (1991), Sneddon and Metzler (1991), Tyndall et al. (1990)

NatureServe cross-reference — *Rhexia virginica* - *Crotalaria sagittalis* Herbaceous Vegetation (CEGL006300)

Common meadowbeauty – Panicgrass (*Rhexia virginica* - *Panicum* spp.) community

HERBACEOUS VEGETATION

This community occurs in a variety of seasonally flooded pond and lakeshore environments. Occurrences are usually small and/or linear, and are dominated primarily by herbaceous, mostly graminoid species. In Connecticut, this community is not well developed. Many species that occur in this community are annual or short-lived perennial plants. Under high water conditions, these plants can persist for years in the seed bank until drought years when the hydrologic conditions are right for germination. As a result, the species composition and areal extent of the community can change from season to season and from year to year.

Regularly occurring species are numerous, including bluejoint (*Calamagrostis canadensis*), panicgrasses (*Panicum rigidulum*, *Panicum* spp.), sedges (*Carex scoparia*, *Fimbristylis autumnalis*, *Rhynchospora capitellata*, *Rhynchospora macrostachya*, *Scirpus cyperinus*), twigrush (*Cladium mariscoides*), and rushes (*Juncus* spp.). Some prominent forbs include common meadowbeauty (*Rhexia virginica*) and marsh seedbox (*Ludwigia palustris*). Other species that may occur are purple false foxglove (*Agalinis purpurea*), threeway sedge (*Dulichium arundinaceum*), spikerush (*Eleocharis obtusa*, *E. palustris*), common boneset (*Eupatorium perfoliatum*), slender goldentop (*Euthamia tenuifolia*), northern St. Johnswort (*Hypericum boreale*), toothcup (*Rotala ramosior*), hyssopleaf hedgenettle (*Stachys hyssopifolia*), Virginia marsh St. Johnswort (*Triadenum virginicum*), bog white violet (*Viola lanceolata*), and bog yelloweyed grass (*Xyris difformis*). In some areas, shrubs such as white meadowsweet (*Spiraea alba* var. *latifolia*), steeplebush (*Spiraea tomentosa*) and common buttonbush (*Cephalanthus occidentalis*) can occur as scattered individuals.

Extent in Connecticut — central and eastern Connecticut

Example — no examples with public access

Basis for description — Sneddon and Metzler (1991), field observations

NatureServe cross-reference — *Rhexia virginica* - *Panicum verrucosum* Herbaceous Vegetation (CEGL006264)

Sevenangle pipewort – Dortmann’s cardinalflower (*Eriocaulon aquaticum* - *Lobelia dortmanna*) intermittently exposed forb vegetation

This aquatic community occurs in the shallow, semipermanently flooded portions of oligotrophic, sandy-bottomed lakes and ponds. Vegetative cover can vary from sparse to dense, consisting primarily of rosette-forming species such as sevenangle pipewort (*Eriocaulon aquaticum*), Dortmann’s cardinalflower (*Lobelia dortmanna*), and several quillworts (*Isoetes* spp.). Other aquatic species include bladderworts (*Utricularia* spp.), pondweeds (*Potamogeton* spp.), and water stargrass (*Callitriche* spp.). This plant association can be negatively impacted by nutrient input from a variety of sources and bottom scour associated with recreational boating and swimming.

Extent in Connecticut — eastern and central Connecticut

Examples — Uncas Pond, Lyme (Nehantic State Forest); Green Falls Pond, Voluntown (Pachaug State Forest)

Basis for description — Gawler (2002), field observations

NatureServe cross-reference — *Eriocaulon aquaticum* - *Lobelia dortmanna* Herbaceous Vegetation (CEGL006346)

Green arrow arum (*Peltandra virginica*) tidally flooded forb vegetation

Green arrow arum – Strawcolored flatsedge (*Peltandra virginica* - *Cyperus strigosus*) community

This herbaceous floodplain marsh community develops in reliably flooded swales and depressions within freshwater tidal marshes. These low lying swales are frequently flooded, often trapping water after the floodwater recedes. The soil moisture regime is very wet. Emergent vegetation is characterized by green arrow arum (*Peltandra virginica*), with broadleaf arrowhead (*Sagittaria latifolia*), pickerelweed (*Pontederia cordata*), strawcolored flatsedge (*Cyperus strigosus*), rice cutgrass (*Leersia oryzoides*), yellowseed false pimpernel (*Lindernia dubia*), and marsh seedbox (*Ludwigia palustris*) also occurring. Occasionally, common reed (*Phragmites australis*), narrowleaf cattail (*Typha angustifolia*), broadleaf cattail (*Typha latifolia*) or river bulrush (*Schoenoplectus fluviatilis*) can dominate, depending on site conditions. Other species that distinguish this community include sweetflag (*Acorus calamus*), tussock sedge (*Carex*

HERBACEOUS VEGETATION

stricta), rice cutgrass (*Leersia oryzoides*), water horsetail (*Equisetum fluviatile*), dotted smartweed (*Polygonum punctatum*), devil's beggartick (*Bidens frondosa*), and harlequin blueflag (*Iris versicolor*). Two additional, non-native invasive plants that can occur in this community are paleyellow iris (*Iris pseudacorus*) and purple loosestrife (*Lythrum salicaria*).

Extent in Connecticut — major tidal rivers

Example — Selden Island Natural Area Preserve, Lyme

Basis for description — Barrett (1989), field descriptions

NatureServe cross-reference — *Peltandra virginica* - *Pontederia cordata* Tidal Herbaceous Vegetation (CEGL004706)

Tidalmarsh amaranth (*Amaranthus cannabinus*) tidally flooded forb vegetation

This vegetation occupies a mid-tidal position on sandy intertidal river shores in slightly brackish waters. It is generally dominated by tidalmarsh amaranth (*Amaranthus cannabinus*), and can be mixed with scattered individuals of annual wildrice (*Zizania aquatica*), common threesquare (*Schoenoplectus pungens*), beggarticks (*Bidens* spp.), and numerous small rosette plants such as arrowheads (*Sagittaria* spp.) This vegetation may be a variant of the Common threesquare - Arrowhead community.

Extent in Connecticut — lower Connecticut River

Example — lower Connecticut River Public Trust lands

Basis for description — field descriptions

NatureServe cross-reference — *Amaranthus cannabinus* Tidal Herbaceous Vegetation (CEGL006080)

Sensitive fern (*Onoclea sensibilis*) tidally flooded forb vegetation

Sensitive fern – River bulrush – Cattail (*Onoclea sensibilis* – *Schoenoplectus fluviatilis* – *Typha* spp.) community

This community has the highest species diversity

of all of the freshwater tidal-marsh communities. While cattails (*Typha angustifolia* and *T. latifolia*) or river bulrush (*Schoenoplectus fluviatilis*) are often as dominant as in the Green arrow arum – Strawcolored flatsedge community, sensitive fern (*Onoclea sensibilis*) is usually abundant and may be dominant. Most of the species that occur in the Green arrow arum – Strawcolored flatsedge community (lower elevation) may also occur here, as well as eastern marsh fern (*Thelypteris palustris*), groundnut (*Apios americana*), Canadian clearweed (*Pilea pumila*), tearthumbs (*Polygonum arifolium*, *P. sagittatum*), and American water horehound (*Lycopus americanus*). Other species, more characteristic of higher elevations, distinguish this community, including royal fern (*Osmunda regalis*), sensitive fern (*Onoclea sensibilis*), joepyeweed (*Eupatorium dubium*), hedge false bindweed (*Calystegia sepium*), and smallspike false nettle (*Boehmeria cylindrica*).

Extent in Connecticut — major tidal rivers

Example — Chapmans Pond, East Haddam (TNC)

Basis for description — Barrett (1989), Metzler and Rozsa (1982)

NatureServe cross-reference — *Impatiens capensis* - *Peltandra virginica* - *Sagittaria latifolia* - (*Typha angustifolia*) Tidal Herbaceous Vegetation (CEGL006325)

Awl-leaf arrowhead (*Sagittaria subulata*) tidally flooded forb vegetation

Awl-leaf arrowhead – Horned pondweed (*Sagittaria subulata* - *Zannichellia palustris*) community

This tidal flat community is best developed along tidal rivers with broad, flat shores. The substrate ranges from mud to sand. The flats are exposed at low tides and submerged at high tides. While often devoid of flora, the vegetation present is often characterized by small rosette plants. Species include arrowhead species (*Sagittaria subulata*, *S. spatulata*), mudwort (*Limosella subulata*), eastern lilaeopsis (*Lilaeopsis chinensis*), horned pondweed (*Zannichellia palustris*), and dwarf spikerush (*Eleocharis parvula*).

Extent in Connecticut — major tidal rivers

Example — Housatonic River Public Trust lands

HERBACEOUS VEGETATION

Basis for description — Barrett (1989), field observations

NatureServe cross-reference - *Sagittaria subulata* - *Limosella australis* Tidal Herbaceous Vegetation (CEGL004473)

Parker's pipewort (*Eriocaulon parkeri*) tidally flooded forb vegetation

Parker's pipewort – Dotted smartweed (*Eriocaulon parkeri* - *Polygonum punctatum*) community

This community occurs only occasionally within Connecticut's freshwater tidal wetlands. The substrate is loamy sand, often with gravel covering the surface. This community is exposed only during low tide and may remain inundated during neap tides. The moisture regime is very wet. Dominant species include dotted smartweed (*Polygonum punctatum*), Parker's pipewort (*Eriocaulon parkeri*), golden hedgehyssop (*Gratiola aurea*), marsh seedbox (*Ludwigia palustris*), and rice cutgrass (*Leersia oryzoides*). In the spring, quillwort (*Isoetes* sp.) can appear dominant. Several species of beggarticks (*Bidens* spp.) occur, as well as many small herbaceous plants represented by only a few individuals. This community is highly variable, with significant fluctuations in floristic composition and species density from year to year.

Extent in Connecticut — freshwater tidal flats at or near the head of tide

Example — Eight Mile River Public Trust lands, Lyme

Basis for description — Barrett (1989)

NatureServe cross-reference — *Eriocaulon parkeri* - *Polygonum punctatum* Herbaceous Vegetation (CEGL006352)

Parker's pipewort – Dwarf St. Johnswort – Golden hedgehyssop (*Eriocaulon parkeri* – *Hypericum mutilum* – *Gratiola aurea*) community

This community occurs in the midtidal range adjacent to and higher in elevation than the Parker's pipewort – Dotted smartweed community. The substrate is wet sand with gravel covering much of the surface. Plants are completely inundated during flood events and high tide, exposed only during low-water tidal conditions. The moisture regime is very wet. Only herbaceous vegetation occurs. Dominant

species include dwarf St. Johnswort (*Hypericum mutilum*) and golden hedgehyssop (*Gratiola aurea*). Other species that commonly occur include common boneset (*Eupatorium perfoliatum*), marsh seedbox (*Ludwigia palustris*), common sneezeweed (*Helenium autumnale*) and Eaton's beggarticks (*Bidens eatonii*). As in the Parker's pipewort – Dotted smartweed community, many other herbaceous plant species occur, represented by only a few individuals. The invasive purple loosestrife (*Lythrum salicaria*) often occurs in this community.

Extent in Connecticut — freshwater tidal flats at or near the head of tide

Example — Eight Mile River Public Trust lands, Lyme

Basis for description — Barrett (1989)

NatureServe cross-reference — *Eriocaulon parkeri* - *Polygonum punctatum* Herbaceous Vegetation (CEGL006352)

Slender glasswort (*Salicornia maritima*) tidally flooded forb vegetation

Slender glasswort – Smooth cordgrass (*Salicornia maritima* - *Spartina alterniflora*) community

This community develops in pannes (shallow depressions with poor drainage) within the salt marsh. These depressions may be created naturally through ice scouring, rafting flotsam and peat compaction, or by mosquito-ditch levees creating impoundments. These areas are flooded by high tides and are poorly drained as the water recedes, impounding water in the depressions. As the water evaporates, high salinity concentrations occur. With increasingly higher salinities, algal mats can cover the soil surface. Soils are similar to those of the Smooth Cordgrass community.

The dominant species of these pannes are slender glasswort (*Salicornia maritima*) and/or a short form of smooth cordgrass (*Spartina alterniflora*). Other common species include Carolina sea lavender (*Limonium carolinianum*), salt marsh plantain (*Plantago maritima* var. *juncooides*), low sea blite (*Suaeda maritima*), and saltmarsh false foxglove (*Agalinis maritima*).

Extent in Connecticut — coastal Connecticut

Example — Barn Island Wildlife Area, Stonington

HERBACEOUS VEGETATION

Basis for description — Barrett (1989), Chapman (1940, 1960), Miller and Egler (1950), Niering and Warren (1980), Nixon (1982), Redfield (1972), Teal (1986), Tiner (1974)

NatureServe cross-reference — *Salicornia (virginica, bigelovii, maritima)* - *Spartina alterniflora* Herbaceous Vegetation (CEGL004308)

Virginia glasswort (*Salicornia virginica*) tidally flooded forb vegetation

This poorly described community occurs on the bay side of coastal barriers adjacent to tidal lagoons, creeks and coves. The substrate is best characterized as regularly flooded, shallow peat overlying sand. This community forms a discontinuous zone of variable width on sheltered portions of backdunes where there is a gradual slope of sand deposits to and into the water's edge. The dominance of Virginia glasswort (*Salicornia virginica*) is characteristic. Associated plants include smooth cordgrass (*Spartina alterniflora*), saltmeadow cordgrass (*Spartina patens*) and sea lavender (*Limonium carolinianum*).

Extent in Connecticut — coastal Connecticut

Examples — Bushy Point Beach (Bluff Point Coastal Reserve), Groton; Milford Point, Milford (Stewart B. McKinney National Wildlife Refuge)

Basis for description — field descriptions, field observations

NatureServe cross-reference — none

American searocket (*Cakile edentula*) tidally flooded forb vegetation

American searocket – Lambsquarters (*Cakile edentula* – *Chenopodium album*) community

Nichols (1920) describes this area as the “middle beach,” extending from the highest point reached by waves of summer storms, extending landward to the upper limit of winter-storm waves. This area is best characterized as a “wrack line” community, characterized by the accumulation of wave-deposited debris. The texture of Connecticut's beaches ranges from fine sand to cobbles. The substrate is dry, rapidly leached, nutrient poor and subject to flooding. This community is typically sparsely vegetated with ephemeral halophytes. Dominant species of sandy beaches include American searocket (*Cakile*

edentula), lambsquarters (*Chenopodium album*), pitseed goosefoot (*Chenopodium berlandieri* var. *macrocalycium*), spear saltbush (*Atriplex patula*) and Russian thistle (*Salsola kali*). On beaches with a stable substrate, the perennial seabeach sandwort (*Honckenya peploides*) may sometimes be found. On cobble beaches, scotch lovage (*Ligusticum scoticum*) and seacoast angelica (*Angelica lucida*) may occur.

Extent in Connecticut — coastal Connecticut

Example — Bluff Point Coastal Reserve, Groton

Basis for description — Nichols (1920), Rozsa (unpublished report)

NatureServe cross-reference — *Cakile edentula* ssp. *edentula* - *Chamaesyce polygonifolia* Sparse Vegetation (CEGL004400)

HYDROMORPHIC ROOTED VEGETATION

Riverweed (*Podostemum ceratophyllum*) permanently flooded vegetation

Riverweed (*Podostemum ceratophyllum*) permanently flooded vegetation occurs in rapidly flowing, clear waters of rivers and streams with a gravelly or cobbly substrate. Riverweed is often the only vascular plant present, forming a low algal-like crust on submerged rocks. It generally has little competition from other plants, although in some streams a variety of algae and/or submerged bryophytes (e.g., *Fontinalis* sp.) occur. In one stream, pondweeds (*Potamogeton* spp.) and Canadian waterweed (*Elodea canadensis*) are also found. The distribution of this vegetation type is currently unknown, due to its inconspicuous growth form and the deleterious effects of poor water quality.

Extent in Connecticut — clear streams in eastern and western Connecticut

Example — Dickenson Creek, Salmon River State Forest, Colchester

Basis for description — field descriptions

NatureServe cross-reference - *Podostemum ceratophyllum* Herbaceous Vegetation (CEGL004331)

Variegated yellow pond-lily (*Nuphar lutea* ssp.

HERBACEOUS VEGETATION

variegata) permanently flooded vegetation

Variegated yellow pond-lily – American white waterlily (*Nuphar lutea* ssp. *variegata* - *Nymphaea odorata*) community

Yellow and white pond/waterlilies (*Nuphar lutea* ssp. *variegatum* and *Nymphaea odorata*) may cover the surface of lakes and ponds where the water depth is generally two to three meters or less. Due to their rhizomatous growth habit, these species can spread quickly and may shade out the growth of other aquatic plants. In areas where waterlilies do not grow with dense cover, other species, such as ribbonleaf pondweed (*Potamogeton epihydrus*), other pondweeds, watershield (*Brasenia schreberi*), and little floatingheart (*Nymphoides cordata*) may also occur. The waterlilies do not appear sensitive to pH changes and are often found in open waters of highly acidic bogs.

Extent in Connecticut — throughout Connecticut

Example — Babcock Pond Wildlife Area, Colchester
Basis for description — McVaugh (1958), Nichols (1915)

NatureServe cross-reference — *Nuphar lutea* ssp. *advena* Herbaceous Vegetation (CEGL004324)

Coon's tail – Canadian waterweed (*Ceratophyllum demersum* – *Elodea canadensis*) permanently flooded vegetation

These aquatic beds are generally found in fresh and slightly brackish tidal rivers with salinities of up to three parts per thousand and alkaline lakes and ponds. Substrate type is variable, with silt as the most frequent type. Other substrates on which these beds may occur include sand/silt, silt and cobble. Composition of beds is highly variable, with either coon's tail (*Ceratophyllum demersum*) or Canadian waterweed (*Elodea canadensis*) dominant and a wide variety of co-occurring species, including: pondweeds (*Potamogeton perfoliatus*, *P. crispus*, *P. pusillus*, *Stuckenia pectinatus*), spike watermilfoil (*Myriophyllum spicatum*), and tapegrass (*Vallisneria americana*).

In alkaline waters, representative pondweeds include *Potamogeton amplifolius*, *P. illinoensis*, *P. natans*, *P. praelongus*, *P. zosteriformis* and *Stuckenia pectinatus*. Additional aquatic species may include nodding water nymph (*Najas flexilis*), longbeak buttercup (*Ranunculus longirostris*), and flatleaf

blatterwort (*Utricularia intermedia*).

Extent in Connecticut — rivers, lakes and ponds

Example — lower Connecticut River, Washinee Lake, Salisbury

Basis for description — Nichols (1915), Barrett et al. (1997), field descriptions, field observations

NatureServe cross-reference — none

Tapegrass (*Vallisneria americana*) permanently flooded vegetation

Tapegrass (*Vallisneria americana*) community

Tapegrass (*Vallisneria americana*) has a wide ecological amplitude, occurring in fresh, brackish and alkaline waters. Beds occur in the shallow portions of lakes and ponds, in tidal rivers and creeks, and in the mainstem of rivers, on a variety of substrates including silt, sand and gravel. Composition of beds is also highly variable, with beds on river mainstems often monospecific. Other species frequently found in beds dominated by tapegrass (*V. americana*) include: coon's tail (*Ceratophyllum demersum*), Canadian waterweed (*Elodea canadensis*), spike watermilfoil (*Myriophyllum spicatum*), and pondweeds (*Stuckenia pectinatus*, *P. perfoliatus* and *P. crispus*).

Extent in Connecticut — throughout Connecticut

Example — Connecticut River

Basis for description — Barrett et al. (1997), field descriptions, field observations

NatureServe cross-reference — *Vallisneria americana* – *Potamogeton perfoliatus* Herbaceous Vegetation (CEGL006196)

Horned pondweed (*Zannichellia palustris*) permanently flooded vegetation

Monospecific beds of horned pondweed (*Zannichellia palustris*) are most often found in brackish water coves and creeks with silt bottoms (occasionally sand/silt). Monospecific beds tend to cover only 10-40% of the area and may occasionally range higher to 40-70% cover. As salinity decreases, beds become mixed, and horned pondweed (*Zannichellia palustris*) is rarely dominant, with species such as coon's tail (*Ceratophyllum demersum*), Canadian

HERBACEOUS VEGETATION

waterweed (*Elodea canadensis*) and claspingleaf pondweed (*Potamogeton perfoliatus*) intermixing.

Extent in Connecticut — major tidal rivers

Example — lower Connecticut River

Basis for description — Barrett et al. (1997), field descriptions, field observations

NatureServe cross-reference — *Stuckenia pectinata* - *Potamogeton perfoliatus* - (*Zannichellia palustris*) Tidal Herbaceous Vegetation (CEGL006027)

Widgeongrass (*Ruppia maritima*) permanently flooded vegetation

These beds of submerged, rooted, aquatic vegetation occur in tidal creeks, pools and coves with brackish water. In the lower Connecticut River, salinity in which widgeongrass is found ranges from 31 to 16.5 parts per thousand. The substrate is usually silt. Local beds tend to cover less than 50% of an area, and beds are often monospecific.

Extent in Connecticut — coastal Connecticut

Example — Bluff Point State Park, Groton

Basis for Description — Barrett et al. (1997), field descriptions, field observations

NatureServe cross-reference — *Ruppia maritima* Acadian, Virginian Zone Temperate Herbaceous Vegetation (CEGL006167)

Eelgrass (*Zostera marina*) permanently flooded vegetation

Eelgrass (*Zostera marina*) meadows are highly productive ecosystems along coastal shorelines. The monospecific stands are host to epiphytic algae and other marine organisms such as young bay scallops. The beds are also important nursery and refuge grounds for juvenile fish. Eelgrass has grasslike leaves with extensive root/rhizome systems that enhance sediment stability. The substrate ranges from soft mud to coarse sand. Light availability is the primary limiting factor in meadow location within the temperature and salinity ranges of eelgrass. The species is highly susceptible to pollution. Historically, eelgrass was common along Connecticut's coast in bays and the lower reaches of tidal rivers and creeks. In the 1930s, eelgrass wasting disease caused massive die-off of most beds, with recovery restricted to limited areas east of the Connecticut River.

Extent in Connecticut — Long Island Sound east of the Connecticut River

Example — Mumford Cove, Groton

Basis for description — Barrett et al. (1997), Nichols (1920), Thayer et al. (1984), field descriptions, field observations

NatureServe cross-reference — *Zostera marina* Herbaceous Vegetation (CEGL004336)



***SPARSE
VEGETATION***

SPARSE VEGETATION

SPARSE VEGETATION

(Consisting of bare mineral substrates; plants are scattered or may be absent, but, if present, cover less than 26% of the substrate.)

CONSOLIDATED ROCK SPARSE VEGETATION

(Vascular vegetation rooting in fissures of rocks or walls or cryptogamic mats on rocks)

Mountain spleenwort (*Asplenium montanum*) sparsely vegetated cliffs

Mountain spleenwort (*Asplenium montanum*) sparse vegetation occurs as small tufts lodged in crevices and cracks on shaded cliffs that receive periodic seepage, generally with little other vascular vegetation. The occurrence and density of bryophytes and lichens varies from site to site. The presence of mountain spleenwort (*Asplenium montanum*) is characteristic. This community occurs on a number of different acidic rock types, including pegmatite, gneiss, and schist. Overhanging trees include a variety of oaks (*Quercus* spp.) and eastern hemlock (*Tsuga canadensis*).

Extent in Connecticut — scattered in eastern and western Connecticut

Example — Naugatuck State Forest, Naugatuck

Basis for description — field descriptions

NatureServe cross-reference — none

Wallrue spleenwort – Purple cliffbrake (*Asplenium ruta-muraria* – *Pellaea atropurpurea*) sparsely vegetated cliffs

This sparse vegetation occurs on shaded to open marble cliffs and boulders in the marble valleys of western Connecticut. These cliffs have little vegetative cover, except in areas where moisture availability and the amount of shade alter plant growth. Mosses and lichens can have moderate coverage, and the other vascular plants that do occur grow on ledges or are rooted in cracks. Herbaceous plants such as wallrue spleenwort (*Asplenium ruta-muraria*), purple cliffbrake (*Pellaea atropurpurea*), maidenhair spleenwort (*Asplenium trichomanes*), bluebell bellflower (*Campanula rotundifolia*), and red columbine (*Aquilegia canadensis*), and mosses

such as *Anomodon rostratus* and *A. attenuatus* are characteristic.

Extent in Connecticut — western marble valleys

Example — no examples with public access

Basis for description — field descriptions

NatureServe cross-reference — none

BOULDER, GRAVEL, COBBLE, OR TALUS SPARSE VEGETATION

(vascular vegetation adapted to movement of more or less unstable, steep slopes of stones that have formed beneath weathering rocks)

Bluebell bellflower – Narrowleaf pinweed (*Campanula rotundifolia* – *Lechea tenuifolia*) sparsely vegetated talus

The pioneer species of traprock slopes are fruticose lichens and mosses — many *Cladonia* and *Polytrichum* species are often present. Ferns and angiosperms often grow in association with the lichens and mosses. These plants are generally perennial and xerophytic; they include bluebell bellflower (*Campanula rotundifolia*), narrowleaf pinweed (*Lechea tenuifolia*), rusty woodsia (*Woodsia ilvensis*), little bluestem (*Schizachyrium scoparium*), red columbine (*Aquilegia canadensis*), churchmouse threeawn (*Aristida dichotoma*), rock harlequin (*Corydalis sempervirens*), poverty oatgrass (*Danthonia spicata*), dwarf dandelion (*Krigia virginica*), silvery cinquefoil (*Potentilla argentea*), and early saxifrage (*Saxifraga virginicensis*).

Extent in Connecticut — central Connecticut

Example — Talcott Mountain State Park, Simsbury

Basis for description — Nichols (1914), field descriptions

NatureServe cross-reference — none

UNCONSOLIDATED MATERIAL SPARSE VEGETATION

(vascular vegetation adapted to movement of more or less unstable, steep slopes of sand, gravel or similar unconsolidated deposits)

NO ASSOCIATIONS DEFINED

GLOSSARY*

acidic

Refers to soils or habitats that have a relatively low pH, generally derived from rocks such as gneiss, schists, granites, and sandstones.

alliance

A group of associations with a defined range of species composition, habitat conditions, and physiognomy, and which contains one or more of a set of diagnostic species, typically at least one of which is found in the uppermost or dominant stratum of the vegetation (Jennings et al. 2003).

alluvial

Characterized by the deposition of sediment by a stream or other running water at any point along its course.

association

A vegetation classification unit consistent with a defined range of species composition, diagnostic species, habitat conditions, and physiognomy (Jennings et al. 2003).

bog

Saturated peatland dominated by dwarf ericaceous shrubs (heaths) influenced by acidic groundwater (poor fen).

brackish water

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

A nonvascular, terrestrial green plant, including mosses, hornworts, and liverworts.

circumneutral

Refers to soils or habitats that are relatively pH neutral, generally derived from marbles.

classification

The grouping of similar types (in this case vegetation types) according to criteria (in this case physiognomic and floristic) (Jennings et al. 2003).

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 cold seasonal influences (temperate).

colluvial

Describes the accumulation of rock, soil, or other material deposited at the base of steep slopes or cliffs.

community

A group of organisms living together and linked by their effects on one another and their responses to the environment they share (Whittaker 1975, Jennings et al. 2003).

conical-crowned

Describes a needle-leaved evergreen tree with a pyramidal or cone-shaped canopy or life form.

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.

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% or more to total dominant plant cover.

diagnostic species

Any species or group of species whose relative constancy or abundance differentiates one vegetation type from another (Jennings et al. 2003).

GLOSSARY

dominant

An organism, group of organisms, or taxon that by its size, abundance, or coverage exerts considerable influence on 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 less than 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% cover, although (rarely) may be less, and tree and taller shrubs generally form less than 25% cover.

ericaceous

Plants belonging to the heath family; e.g., mountain laurel, blueberries, etc.

evergreen

Describes a plant that has green leaves 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% or more to total dominant plant cover; vegetation canopy is never without photosynthetic tissue.

fen

Seasonally flooded peatland dominated by sedges and shrubs influenced by acidic or base-rich surface water.

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% cover; includes reproductive stages or immature second-

ary 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 and the branches solid, hollow and round, or flattened without distinctly differentiated upper and lower surfaces; squamulose lichens are included.

glaciofluvial

A geological process referring to landform features originating from sediments deposited by glacial meltwaters.

graminoid

Grasses and grass-like plants, including sedges and rushes.

grassland

Vegetation dominated by perennial graminoid plants.

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.

herbaceous vegetation

Vegetation in which herbs (mostly graminoids, forbs, and ferns) form at least 25% cover, and woody vegetation has generally less than 25% cover; herbaceous cover may be less than 25% in cases where the cover of each of the other life forms present is less than 25% and herbaceous cover exceeds the cover of the other life forms.

lichen

An organism generally recognized as a single plant that consists of a fungus and an alga or cyanobacterium living in symbiotic association.

low forb

A broad-leaved herbaceous plant usually less than 1 meter, or 3 feet, tall when inflorescences are fully developed.

GLOSSARY

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 from 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 square millimeters, or 1 square inch.

mixed evergreen-deciduous

Describes vegetation in which evergreen and deciduous species each generally contribute 25-75% to the total canopy cover.

needle-leaved

Describes a plant with slender, elongated leaves; for example, pine and hemlock trees (*Pinus* and *Tsuga*).

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% cover, with other vegetation forming less than 25% cover; nonvascular cover may be less than 25% in cases where the cover of each of the other life forms present is less than 25% 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 which persists for several years.

perennial herbaceous vegetation

Associations that persist for several years and are dominated by herbaceous species.

permanently flooded

Describes land surface covered by water at all times of the year in all years. (Equivalent to Cowardin et al. (1979) Permanently Flooded modifier.)

physiognomy

The visible structure or outward appearance of a plant community as expressed by the dominant growth forms, such as their leaf appearance or deciduousness. (Fosberg 1961, Jennings et al. 2003)

rounded-crowned

Describes a needle-leaved evergreen tree with a semicircular canopy or life form; for example, eastern white pine and pitch pine (*Pinus strobus* and *Pinus rigida*).

salt water

Water with a salinity of greater than 30 parts per thousand.

saturated

Describes land where surface water is seldom present, but where substrate is saturated to the surface for extended periods during the growing season. (Equivalent to Cowardin et al. (1979) Saturated modifier.)

scale-leaved

Describes a plant with small, overlapping leaves that usually lie flat on the stem; for example, eastern redcedar (*Juniperus virginiana*).

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.

seasonally flooded

Describes land where surface water persists for extended periods throughout 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 et al. (1979) Seasonal, Seasonal-Saturated, and Seasonal-Well Drained modifiers.)

semipermanently flooded

Describes land where surface water persists throughout the growing season in most years except during periods of drought; land surface is normally saturated when water level drops below soil surface. (Includes Cowardin et al. (1979) Intermittently Exposed and Semipermanently Flooded modifiers.)

short grassland

Graminoid-dominated vegetation usually less than 0.5 meters, or 1.5 feet, tall when inflorescences are fully developed.

shrub

A 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% cover, with trees forming less than 25% cover; shrub cover may be less than 25% in cases where the cover of each of the other life forms present is less than 25% and the shrub cover exceeds the cover of other life forms; does not include developing secondary associations dominated by tree species.

soil moisture regime

The amount of water available to plants. Soil moisture regime is evaluated on the basis of soil drainage, structure and texture, and climate. Thus a well-drained till soil is much moister than a well-drained sand and gravel soil in the same area.

sparse vegetation /sparsely vegetated

Vegetation with low total plant cover (generally less than 10%) that is scattered or nearly absent (less than 1%); areas with high cover of crustose lichen and no other vegetation are included here.

subacidic

Refers to soils or habitats that are relatively base rich, generally derived from rock types such as basalt, diabase, or calcareous shales and schists.

tall forb

Broad-leaved herbaceous plants usually greater

than 1 meter, or 3 feet, tall when inflorescences are fully developed.

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.

talus

A sloping accumulation of coarse rock fragments at the base of a cliff.

temperate

Geographically, describes 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

Describes land where surface water persists for brief periods during the growing season, but the water table usually lies well below soil surface; often characterizes floodplain wetlands. (Equivalent to Cowardin et al. (1979) Temporary modifier.)

tidally flooded

Describes land flooded by the alternate rise and fall of the surface of the ocean and the adjoining bays and rivers, etc.; caused by the attraction of the moon and the sun.

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 multistemmed or short growth form (less than 4 meters, or 13 feet, in height).

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

Plant with water and fluid conductive tissue (xylem and phloem); includes seed plants, ferns, and fern allies.

vegetation

The collective plant cover of an area (Jennings et al. 2003).

GLOSSARY

woodland

Vegetation dominated by open stands of trees with crowns not usually touching (generally forming 25-60% cover).

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.

xeric

Refers to extremely dry moisture conditions found on habitats such as bedrock outcrops, ledges, or excessively drained sands.

*Except as otherwise noted, definitions are from Grossman et al. (1998)



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LIST OF APPENDICES

APPENDIX I

INDEX OF THE VEGETATION CLASSIFICATION

APPENDIX II

CONNECTICUT VEGETATION ORGANIZED BY NATURAL COMMUNITY TYPES

APPENDIX III

SOIL DRAINAGE AND MOISTURE CLASSES

APPENDIX IV

TYPICAL TOPOSEQUENCES OF MAJOR VEGETATION TYPES



APPENDIX I

Index of the Vegetation Classification

FORESTS

Evergreen Forests	8
Temperate needle-leaved evergreen forests	8
Conical-crowned temperate needle-leaved evergreen forests	
Eastern hemlock (<i>Tsuga canadensis</i>) forests	
Seasonally flooded temperate needle-leaved evergreen forests	8
Eastern hemlock (<i>Tsuga canadensis</i>) seasonally flooded forests	
Atlantic white cedar (<i>Chamaecyparis thyoides</i>) seasonally flooded forests	
Atlantic white cedar / Great laurel (<i>Chamaecyparis thyoides</i> / <i>Rhododendron maximum</i>) community	
Atlantic white cedar – Red maple – Yellow birch (<i>Chamaecyparis thyoides</i> – <i>Acer rubrum</i> – <i>Betula alleghaniensis</i>) community	
Atlantic white cedar / Swamp azalea (<i>Chamaecyparis thyoides</i> / <i>Rhododendron viscosum</i>) community	
Northern white cedar (<i>Thuja occidentalis</i>) seasonally flooded forests	
Saturated temperate needle-leaved evergreen forests	10
Red spruce (<i>Picea rubens</i>) saturated forests	
Red spruce / Common mountain holly (<i>Picea rubens</i> / <i>Nemopanthus mucronata</i>) community	
Black spruce (<i>Picea mariana</i>) saturated forests	
Black spruce / Sheep laurel (<i>Picea mariana</i> / <i>Kalmia angustifolia</i>) community	
Deciduous Forests	11
Cold-deciduous forests	11
Lowland and submontaine cold-deciduous forests	11
Sugar maple – American beech – Yellow birch (<i>Acer saccharum</i> - <i>Fagus grandifolia</i> – <i>Betula alleghaniensis</i>) forests	
Sugar maple – American beech / Hobblebush (<i>Acer saccharum</i> - <i>Fagus grandifolia</i> / <i>Viburnum lantanoides</i>) community	
Sugar maple – American beech / Intermediate woodfern (<i>Acer saccharum</i> - <i>Fagus grandifolia</i> / <i>Dryopteris intermedia</i>) community	
Sugar maple – White ash – American basswood (<i>Acer saccharum</i> - <i>Fraxinus americana</i> - <i>Tilia americana</i>) forests	
Sugar maple – White ash / Blue cohosh (<i>Acer saccharum</i> - <i>Fraxinus americana</i> / <i>Caulophyllum thalictroides</i>) community	
Sugar maple – White ash / Silver false spleenwort (<i>Acer saccharum</i> - <i>Fraxinus americana</i> / <i>Deparia acrostichoides</i>) community	
Sugar maple – White ash / New York fern (<i>Acer saccharum</i> - <i>Fraxinus americana</i> / <i>Thelypteris noveboracensis</i>) community	
Sugar maple – Oak (<i>Acer saccharum</i> - <i>Quercus</i> spp.) forests	
Sugar maple – White ash / Roundlobe hepatica (<i>Acer saccharum</i> - <i>Fraxinus americana</i> / <i>Hepatica nobilis</i> var. <i>obtusa</i>) community	
Sugar maple – Chinkapin oak / Bristleleaf sedge (<i>Acer saccharum</i> - <i>Quercus muhlenbergii</i> / <i>Carex eburnea</i>) community	
Pignut hickory – White ash (<i>Carya glabra</i> - <i>Fraxinus americana</i>) forests	
Northern red oak / Flowering dogwood (<i>Quercus rubra</i> / <i>Cornus florida</i>) forests	
Northern red oak / Mapleleaf viburnum (<i>Quercus rubra</i> / <i>Viburnum acerifolium</i>) community	
American beech – White oak – Northern red oak – Tulip tree (<i>Fagus grandifolia</i> - <i>Quercus alba</i> - <i>Quercus rubra</i> - <i>Liriodendron tulipifera</i>) community	
Northern red oak - Black oak – Chestnut oak (<i>Quercus rubra</i> - <i>Quercus velutina</i> - <i>Quercus prinus</i>) forests	

Black oak - Chestnut oak / Black huckleberry (*Quercus velutina* – *Quercus prinus* / *Gaylussacia baccata*) community
 Northern red oak - Black oak / Blue Ridge blueberry (*Quercus rubra* - *Quercus velutina* / *Vaccinium pallidum*) community
 Northern red oak – Yellow birch (*Quercus rubra* - *Betula alleghaniensis*) forests
 Northern red oak – Yellow birch / Cinnamon fern (*Quercus rubra* - *Betula alleghaniensis* / *Osmunda cinnamomea*) community
 Temporarily flooded cold-deciduous forests 16
 Sugar maple – Bitternut hickory (*Acer saccharum*- *Carya cordiformis*) temporarily flooded forests
 Sugar maple –White ash / Sprengel’s sedge (*Acer saccharum* - *Fraxinus americana* / *Carex sprengealli*) community
 Silver maple – Eastern cottonwood (*Acer saccharinum* - *Populus deltoides*) temporarily flooded forests
 Silver maple / Smallspike false nettle (*Acer saccharinum* / *Boehmeria cylindrica*) community
 Silver maple / Sensitive fern (*Acer saccharinum* / *Onoclea sensibilis*) community
 Silver maple / White snakeroot (*Acer saccharinum* / *Ageratina altissima*) community
 Pin oak – Green ash (*Quercus palustris* - *Fraxinus pennsylvanica*) temporarily flooded forests
 American sycamore – Boxelder (*Platanus occidentalis* - *Acer negundo*) temporarily flooded forests
 Seasonally flooded cold-deciduous forests 18
 Red maple / Skunk cabbage (*Acer rubrum* / *Symplocarpus foetidus*) seasonally flooded forests
 Red maple – Black ash / Bristly buttercup (*Acer rubrum* - *Fraxinus nigra* / *Ranunculus hispidus* var. *caricetorum*) community
 Red maple / Northern spicebush (*Acer rubrum* / *Lindera benzoin*) community
 Red maple / Highbush blueberry (*Acer rubrum* / *Vaccinium corymbosum*) seasonally flooded forests
 Red maple / Common winterberry – Highbush blueberry (*Acer rubrum* / *Ilex verticillata* - *Vaccinium corymbosum*) community
 Red maple – Pin oak (*Acer rubrum* - *Quercus palustris*) seasonally flooded forests

WOODLANDS 21
 Evergreen Woodlands. 21
 Needle-leaved evergreen woodlands. 22
 Temperate needle-leaved evergreen woodlands
 Pitch pine (*Pinus rigida*) woodlands
 Pitch pine / Bear oak (*Pinus rigida* / *Quercus ilicifolia*) community
 Pitch pine / Lowbush blueberry (*Pinus rigida* / *Vaccinium angustifolium*) community
 Eastern redcedar (*Juniperus virginiana*) woodlands
 Eastern redcedar / Poverty oatgrass (*Juniperus virginiana* / *Danthonia spicata*) community
 Eastern redcedar - Hophornbeam (*Juniperus virginiana* - *Ostrya virginiana*) community
 Saturated needle-leaved evergreen woodlands 23
 Black spruce (*Picea mariana*) saturated woodlands
 Black spruce / Common mountain holly (*Picea mariana* / *Nemopanthus mucronata*) community
 Atlantic white cedar (*Chamaecyparis thyoides*) / saturated woodlands
 Atlantic white cedar (*Chamaecyparis thyoides*) / Leatherleaf (*Chamaedaphne calyculata*) community

APPENDIX I

Deciduous Woodlands	24
Cold-deciduous woodlands	24
Temperate cold-deciduous woodlands	24
Scarlet oak – Sassafras (<i>Quercus coccinea</i> - <i>Sassafras albidum</i>) woodlands	
Northern red oak / Rock polypody (<i>Quercus rubra</i> / <i>Polypodium virginiana</i>) woodlands	
Sweet birch – White ash / Robert geranium (<i>Betula lenta</i> - <i>Fraxinus americana</i> / <i>Geranium robertianum</i>) woodlands	
Sugar maple – American basswood / Mountain maple (<i>Acer saccharum</i> – <i>Tilia americana</i> / <i>Acer spicatum</i>) woodlands	
Seasonally flooded cold-deciduous woodlands	25
Red maple (<i>Acer rubrum</i>) seasonally flooded woodlands	
Red maple / Hairy sedge (<i>Acer rubrum</i> / <i>Carex lacustris</i>) community	
Red maple / Tussock sedge (<i>Acer rubrum</i> / <i>Carex stricta</i>) community	
Tidally flooded cold-deciduous woodlands	26
Red maple – Green ash (<i>Acer rubrum</i> - <i>Fraxinus pennsylvanica</i>) tidally flooded woodlands	
Red maple – Green ash / Knotweed (<i>Acer rubrum</i> - <i>Fraxinus pennsylvanica</i> / <i>Polygonum</i> spp.) community	
Mixed Evergreen - Deciduous Woodlands	26
Mixed needle-leaved evergreen - cold-deciduous woodlands	26
Temperate mixed needle-leaved evergreen - cold-deciduous woodlands	26
Pitch pine – Post oak (<i>Pinus rigida</i> - <i>Quercus stellata</i>) woodlands	
SHRUBLANDS	29
Deciduous Shrublands	30
Cold-deciduous shrublands	30
Temperate cold-deciduous shrublands	30
Northern bayberry – Beach plum (<i>Morella pensylvanica</i> - <i>Prunus maritima</i>) shrublands	
Bear oak (<i>Quercus ilicifolia</i>) shrublands	
Temporarily flooded cold-deciduous shrublands	
Black willow (<i>Salix nigra</i>) temporarily flooded shrublands	
Black willow / Fall panicgrass (<i>Salix nigra</i> / <i>Panicum dichotomiflorum</i>) community	
Speckled alder (<i>Alnus incana</i> ssp. <i>rugosa</i>) temporarily flooded shrublands	
Speckled alder – Willow (<i>Alnus incana</i> ssp. <i>rugosa</i> – <i>Salix</i> spp.) community	
Seasonally flooded cold-deciduous shrublands	31
Highbush blueberry (<i>Vaccinium corymbosum</i>) seasonally flooded shrublands	
Highbush blueberry – Swamp azalea (<i>Vaccinium corymbosum</i> - <i>Rhododendron viscosum</i>) community	
Shrubby cinquefoil (<i>Dasiphora floribunda</i>) seasonally flooded shrublands	
Shrubby cinquefoil – Bog birch / Hairy sedge (<i>Dasiphora floribunda</i> - <i>Betula pumila</i> / <i>Carex lacustris</i>) community	
Shrubby cinquefoil – Sageleaf willow – Silky dogwood / Tussock sedge (<i>Dasiphora floribunda</i> - <i>Salix candida</i> - <i>Cornus amomum</i> / <i>Carex stricta</i>) community	
Shrubby cinquefoil – Sweetgale / Woollyfruit sedge – Twigrush (<i>Dasiphora floribunda</i> - <i>Myrica gale</i> / <i>Carex lasiocarpa</i> - <i>Cladium mariscoides</i>) community	
Semipermanently flooded cold-deciduous shrublands	32
Common buttonbush (<i>Cephalanthus occidentalis</i>) semipermanently flooded shrublands	
Common buttonbush / Rattlesnake mannagrass (<i>Cephalanthus occidentalis</i> / <i>Glyceria canadensis</i>) community	
Swamp loosestrife (<i>Decodon verticillatus</i>) semipermanently flooded shrublands	
Tidally flooded cold-deciduous shrublands	33
Northern marshelder (<i>Iva frutescens</i>) tidally flooded shrublands	
Northern marshelder / Switchgrass (<i>Iva frutescens</i> / <i>Panicum virgatum</i>) community	
Speckled alder – Silky dogwood – Common winterberry (<i>Alnus incana</i> ssp. <i>rugosa</i> - <i>Cornus amomum</i> - <i>Ilex verticillata</i>) tidally flooded shrublands	

APPENDIX I

DWARF-SHRUBLANDS	35
Evergreen Dwarf-shrublands	36
Needle-leaved and microphyllous evergreen dwarf-shrublands	36
Creeping or matted needle-leaved or microphyllous evergreen dwarf-shrubland	36
False beachheather (<i>Hudsonia tomentosa</i>) dwarf-shrublands	
Kinnikinnuck – Lowbush blueberry (<i>Arctostaphylos uvi-ursi</i> - <i>Vaccinium angustifolium</i>) dwarf-shrublands	
Broad-leaved evergreen dwarf-shrublands	
Saturated broad-leaved evergreen dwarf-shrublands	
Leatherleaf (<i>Chamaedaphne calyculata</i>) saturated dwarf-shrubland	
Leatherleaf / Black spruce (<i>Chamaedaphne calyculata</i> / <i>Picea mariana</i>) community	
Leatherleaf / White beaksedge (<i>Chamaedaphne calyculata</i> / <i>Rhynchospora alba</i>) community	
Leatherleaf / Virginia marsh St. Johnswort (<i>Chamaedaphne calyculata</i> / <i>Triadenum virginicum</i>) community	
Leatherleaf / Northwest Territory sedge (<i>Chamaedaphne calyculata</i> / <i>Carex utriculata</i> var. <i>rostrata</i>) community	
Sweetgale (<i>Myrica gale</i>) saturated dwarf-shrublands	
Sweetgale – White meadowsweet – Leatherleaf (<i>Myricagale</i> - <i>Spiraea alba</i> - <i>Chamaedaphne calyculata</i>) community	
Deciduous Dwarf-shrublands	38
Broad-leaved cold-deciduous dwarf-shrublands	38
Saturated broad-leaved cold-deciduous dwarf-shrublands	38
Black huckleberry (<i>Gaylussacia baccata</i>) saturated dwarf-shrublands	
Dwarf huckleberry (<i>Gaylussacia dumosa</i>) saturated dwarf-shrublands	
HERBACEOUS VEGETATION	39
Graminoid vegetation	40
Temperate grasslands	40
Tall temperate grasslands	40
Big bluestem – Indiangrass (<i>Andropogon gerardii</i> - <i>Sorghastrum nutans</i>) tall grasslands	
Medium-tall temperate grasslands	40
Little bluestem – Poverty oatgrass (<i>Schizachyrium scoparium</i> - <i>Danthonia spicata</i>) medium-tall grasslands	
Little bluestem – Orangegrass (<i>Schizachyrium scoparium</i> - <i>Hypericum gentianoides</i>) community	
Little bluestem / Sesquehana sandcherry (<i>Schizachyrium scoparium</i> / <i>Prunus pumila</i> var. <i>susquehanae</i>) community	
Little bluestem – Sideoats grama (<i>Schizachyrium scoparium</i> - <i>Bouteloua curtipendula</i>) medium-tall grasslands	
American beachgrass (<i>Ammophila breviligulata</i>) medium-tall grasslands	
Switchgrass (<i>Panicum virgatum</i>) medium-tall grasslands	
Temporarily flooded tall temperate grasslands	42
Reed canarygrass (<i>Phalaris arundinacea</i>) temporarily flooded grasslands	
Common reed (<i>Phragmites australis</i>) temporarily flooded grasslands	
Big bluestem (<i>Andropogon gerardii</i>) temporarily flooded grasslands	
Big bluestem – Bluebell bellflower (<i>Andropogon gerardii</i> - <i>Campanula rotundifolia</i>) community	
Bluejoint (<i>Calamagrostis canadensis</i>) temporarily flooded grasslands	
Bluejoint – Bog white violet (<i>Calamagrostis canadensis</i> - <i>Viola lanceolata</i>) community	
Temporarily flooded short temperate grasslands	43
Twisted sedge (<i>Carex torta</i>) temporarily flooded grasslands	
Seasonally flooded temperate grasslands	43

Tussock sedge (<i>Carex stricta</i>) seasonally flooded grasslands	
Hairy sedge – Cattail (<i>Carex lacustris</i> - <i>Typha</i> spp.) seasonally flooded grasslands	
Saturated medium-tall temperate grasslands	44
Woollyfruit sedge (<i>Carex lasiocarpa</i>) saturated grasslands	
Woollyfruit sedge – Water sedge (<i>Carex lasiocarpa</i> - <i>Carex aquatilis</i> var. <i>aquatilis</i>) community	
Woollyfruit sedge / Leatherleaf (<i>Carex lasiocarpa</i> / <i>Chamaedaphne calyculata</i>) community	
Twigrush (<i>Cladium mariscoides</i>) saturated grasslands	
Twigrush – White beaksedge (<i>Cladium mariscoides</i> - <i>Rhynchospora alba</i>) community	
Twigrush – Meager sedge (<i>Cladium mariscoides</i> - <i>Carex exilis</i>) community	
Twigrush – Spoonleaf sundew – Beaked spikerush (<i>Cladium mariscoides</i> - <i>Drosera intermedia</i> - <i>Eleocharis rostellata</i>) community	
Inland sedge – Bristlystalked sedge – Yellow sedge (<i>Carex interior</i> - <i>Carex leptalea</i> - <i>Carex flava</i>) saturated grasslands	
Dioecious sedge / Shrubby cinquefoil (<i>Carex sterilis</i> / <i>Dasiphora floribunda</i>) community	
Dioecious sedge / Gray dogwood (<i>Carex sterilis</i> / <i>Cornus racemosa</i>) community	
Saturated short temperate grasslands	46
White beaksedge (<i>Rhynchospora alba</i>) saturated grasslands	
White beaksedge / Sphagnum moss (<i>Rhynchospora alba</i> / <i>Sphagnum cuspidatum</i>) community	
Semipermanently flooded temperate grasslands	46
Broadleaf cattail (<i>Typha latifolia</i>) semipermanently flooded grasslands	
Threeway sedge (<i>Dulichium arundinacea</i>) semipermanently flooded grasslands	
Threeway sedge / Sphagnum moss (<i>Dulichium arundinacea</i> / <i>Sphagnum</i> spp.) community	
Threeway sedge – Swamp-candles (<i>Dulichium arundinacea</i> - <i>Lysimachia terrestris</i>) community	
Hardstem bulrush (<i>Schoenoplectus acutus</i>) semipermanently flooded grasslands	
Tidally flooded tall temperate grasslands	47
Smooth cordgrass (<i>Spartina alterniflora</i>) tidally flooded grasslands	
Smooth cordgrass (<i>Spartina alterniflora</i>) community	
Smooth cordgrass – Eastern lilaeopsis (<i>Spartina alterniflora</i> - <i>Lilaeopsis chinensis</i>) community	
Common threesquare (<i>Schoenoplectus pungens</i>) tidally flooded grasslands	
Common threesquare – Sturdy bulrush (<i>Schoenoplectus pungens</i> - <i>Schoenoplectus robustus</i>) community	
Common threesquare – Arrowhead (<i>Schoenoplectus pungens</i> - <i>Sagittaria</i> spp.) community	
Annual wildrice (<i>Zizania aquatica</i>) tidally flooded grasslands	
Annual wildrice – Pickerelweed (<i>Zizania aquatica</i> - <i>Pontederia cordata</i>) community	
Narrowleaf cattail (<i>Typha angustifolia</i>) tidally flooded grasslands	
Narrowleaf cattail – Rosemallow (<i>Typha angustifolia</i> - <i>Hibiscus moscheutos</i>) community	
Sweetflag (<i>Acorus calamus</i>) tidally flooded grasslands	
River bulrush (<i>Schoenoplectus fluviatilis</i>) tidally flooded grasslands	
Hairy sedge (<i>Carex lacustris</i>) tidally flooded grasslands	
Hairy sedge – Bluejoint – Canada wildrye (<i>Carex lacustris</i> - <i>Calamagrostis canadensis</i> - <i>Elymus canadensis</i>) community	
Tidally flooded short temperate grasslands	50
Saltmeadow cordgrass (<i>Spartina patens</i>) tidally flooded grasslands	
Saltmeadow cordgrass – Spike-grass (<i>Spartina patens</i> - <i>Distichlis spicata</i>) community	
Saltmeadow cordgrass – Creeping bentgrass (<i>Spartina patens</i> - <i>Agrostis stolonifera</i>) community	
Herbaceous Forb Vegetation	51

APPENDIX I

Temperate forb vegetation	51
Low forb vegetation	51
Seaside threeawn – Field sagewort (<i>Aristida tuberculosa</i> - <i>Artemisia campestris</i> ssp. <i>caudata</i>) forb vegetation	
Saturated forb vegetation	51
American golden saxifrage (<i>Chrysosplenium americanum</i>) saturated forb vegetation	
Semipermanently flooded forb vegetation	51
Green arrow arum – Lizard’s tail (<i>Peltandra virginica</i> - <i>Saururus cernuus</i>) semipermanently flooded forb vegetation	
Pickerelweed – Green arrow arum (<i>Pontederia cordata</i> - <i>Peltandra virginica</i>) semipermanently flooded forb vegetation	
Intermittently exposed forb vegetation	52
Common meadowbeauty (<i>Rhexia virginica</i>) intermittently exposed forb vegetation	
Common meadowbeauty – Golden hedgehyssop (<i>Rhexia virginica</i> - <i>Gratiola aurea</i>) community	
Common meadowbeauty – Panicgrass (<i>Rhexia virginica</i> - <i>Panicum</i> spp.) community	
Sevenangle pipewort – Dortmann’s cardinalflower (<i>Eriocaulon aquaticum</i> - <i>Lobelia dortmanna</i>) intermittently exposed forb vegetation	
Tidally flooded tall forb vegetation	53
Green arrow arum (<i>Peltandra virginica</i>) tidally flooded forb vegetation	
Green arrow arum – Strawcolored flatsedge (<i>Peltandra virginica</i> - <i>Cyperus strigosus</i>) community	
Tidalmarsh amaranth (<i>Amaranthus cannabinus</i>) tidally flooded forb vegetation	
Sensitive fern (<i>Onoclea sensibilis</i>) tidally flooded forb vegetation	
Sensitive fern – River bulrush – Cattail (<i>Onoclea sensibilis</i> - <i>Schoenoplectus fluviatilis</i> - <i>Typha</i> spp.) community	
Tidally flooded temperate low forb vegetation	54
Awl-leaf arrowhead (<i>Sagittaria subulata</i>) tidally flooded forb vegetation	
Awl-leaf arrowhead – Horned pondweed (<i>Sagittaria subulata</i> - <i>Zannichellia palustris</i>) community	
Parker’s pipewort (<i>Eriocaulon parkeri</i>) tidally flooded forb vegetation	
Parker’s pipewort – Dotted smartweed (<i>Eriocaulon parkeri</i> - <i>Polygonum punctatum</i>) community	
Parker’s pipewort – Dwarf St. Johnswort – Golden hedgehyssop (<i>Eriocaulon parkeri</i> - <i>Hypericum mutilum</i> - <i>Gratiola aurea</i>) community	
Slender glasswort (<i>Salicornia maritima</i>) tidally flooded forb vegetation	
Slender glasswort – Smooth cordgrass (<i>Salicornia maritima</i> - <i>Spartina alterniflora</i>) community	
Virginia glasswort (<i>Salicornia virginica</i>) tidally flooded forb vegetation	
American searocket (<i>Cakile edentula</i>) tidally flooded forb vegetation	
American searocket – Lambsquarters (<i>Cakile edentula</i> - <i>Chenopodium album</i>) community	
Hydromorphic Rooted Vegetation	56
Temperate hydromorphic rooted vegetation	56
Permanently flooded hydromorphic rooted vegetation	56
Riverweed (<i>Podostemum ceratophyllum</i>) permanently flooded vegetation	
Variegated yellow pond-lily (<i>Nuphar lutea</i> ssp. <i>variegata</i>) permanently flooded vegetation	
Variegated yellow pond-lily – American white waterlily (<i>Nuphar lutea</i> ssp. <i>variegata</i> - <i>Nymphaea odorata</i>) community	
Coon’s tail – Canadian waterweed (<i>Ceratophyllum demersum</i> – <i>Elodea canadensis</i>) permanently flooded vegetation	
Tapegrass (<i>Vallisneria americana</i>) permanently flooded vegetation	
Tapegrass (<i>Vallisneria americana</i>) community	
Horned pondweed (<i>Zannichellia palustris</i>) permanently flooded vegetation	

APPENDIX I

Widgeongrass (*Ruppia maritima*) permanently flooded vegetation

Eelgrass (*Zostera marina*) permanently flooded vegetation

SPARSE VEGETATION	59
Consolidated Rock Sparse Vegetation	60
Mountain spleenwort (<i>Asplenium montanum</i>) sparsely vegetated cliffs	
Wallrue spleenwort – Purple cliffbrake (<i>Asplenium ruta-muraria</i> – <i>Pellaea atropurpurea</i>) sparsely vegetated cliffs	
Boulder, Gravel, Cobble, or Talus Sparse Vegetation	60
Bluebell bellflower – Narrowleaf pinweed (<i>Campanula rotundifolia</i> - <i>Lechea tenuifolia</i>) sparsely vegetated talus	
Unconsolidated Material Sparse Vegetation	60
No associations defined	



APPENDIX II

Connecticut Vegetation Organized by Natural Community Types

Terrestrial System — Nonforested Communities

Rocky Summits/Outcrops — Dry to xeric exposed summits, ledges, and other outcrops with a vegetation of low shrubs, grasses, and herbs.

Acidic Rocky Summits/Outcrops (gneiss, schist, granite, sandstone)

Little bluestem – Poverty oatgrass (*Schizachyrium scoparium* - *Danthonia spicata*) medium-tall grasslands

Little bluestem / Sesquehana sandcherry (*Schizachyrium scoparium* / *Prunus pumila* var. *susquehanae*) community

Pitch pine (*Pinus rigida*) woodlands

Pitch pine / Bear oak (*Pinus rigida* / *Quercus ilicifolia*) community

Bear oak (*Quercus ilicifolia*) shrublands

Mountain spleenwort (*Asplenium montanum*) sparsely vegetated cliffs

Subacidic Rocky Summits/Outcrops (basalt, diabase, calcareous shales and schists)

Eastern redcedar (*Juniperus virginiana*) woodlands

Eastern redcedar / Poverty oatgrass (*Juniperus virginiana* / *Danthonia spicata*) community

Kinnikinnuck – Lowbush blueberry (*Arctostaphylos uvi-ursi* - *Vaccinium angustifolium*) dwarf-shrublands

Circumneutral Rocky Summits/Outcrops (marble)

Eastern redcedar (*Juniperus virginiana*) woodlands

Eastern redcedar - Hophornbeam (*Juniperus virginiana* - *Ostrya virginiana*) community

Little bluestem – Sideoats grama (*Schizachyrium scoparium* - *Bouteloua curtipendula*) medium-tall grasslands

Wallrue spleenwort – Purple cliffbrake (*Asplenium ruta-muraria* – *Pellaea atropurpurea*) sparsely vegetated cliffs

Cliffs — Dry to xeric exposed and shaded cliffs and cliff faces with sparse vegetation in cracks, crevices and other fissures.

Consolidated Rock Sparse Vegetation

Talus — Dry coarse-textured colluvial deposits of rock and boulders below cliffs and ledges with an open vegetation of vines, scattered herbs, and lichens.

Bluebell bellflower – Narrowleaf pinweed (*Campanula rotundifolia* - *Lechea tenuifolia*) sparsely vegetated talus

Sand Barrens — Dry glaciofluvial deposits with shrubby or grassy vegetation maintained by fire.

Bear oak (*Quercus ilicifolia*) shrublands

Kinnikinnuck – Lowbush blueberry (*Arctostaphylos uvi-ursi* - *Vaccinium angustifolium*) dwarf-shrublands

Big bluestem – Indiangrass (*Andropogon gerardii* - *Sorghastrum nutans*) tall grasslands

Little bluestem – Poverty oatgrass (*Schizachyrium scoparium* - *Danthonia spicata*) medium-tall grasslands

Little bluestem – Orangegrass (*Schizachyrium scoparius* - *Hypericum gentianoides*) community

Coastal Sand Dunes — Poorly developed depositional systems on Long Island Sound with adjacent low-energy beaches.

Northern bayberry – Beach plum (*Morella pensylvanica* - *Prunus maritima*) shrublands

False beachheather (*Hudsonia tomentosa*) dwarf-shrublands

American beachgrass (*Ammophila breviligulata*) medium-tall grasslands

APPENDIX II

Seaside threeawn – Field sagewort (*Aristida tuberculosa* - *Artemisia campestris* ssp. *caudata*)
low forb vegetation

Coastal Headlands — Dry seaside cliffs, bluffs, and other open headlands exposed to winds and salt spray.

Pitch pine – Post oak (*Pinus rigida* - *Quercus stellata*) woodlands

Terrestrial System — Forested communities

Talus Forest/Woodlands — Dry to moist open woodlands or forests on coarse colluvial deposits with soil and humus in pockets between the rocks.

Acidic Talus Forest/Woodlands

Northern red oak / Rock polypody (*Quercus rubra* / *Polypodium virginiana*) woodlands
Sugar maple – American basswood / Mountain maple (*Acer saccharum* – *Tilia americana* /
Acer spicatum) woodlands

Subacidic Talus Forest/Woodlands

Yellow birch – White ash / Robert geranium (*Betula lenta* - *Fraxinus americana* / *Geranium robertianum*) woodlands

Subacidic Cold Talus Forest/Woodlands

Yellow birch – White ash / Robert geranium (*Betula lenta* - *Fraxinus americana* / *Geranium robertianum*) woodlands

Circumneutral Talus Forest/Woodlands

Sugar maple – White ash – American basswood (*Acer saccharum* - *Fraxinus americana*
- *Tilia americana*) forests
Sugar maple – White ash / Blue cohosh (*Acer saccharum* - *Fraxinus americana* /
Caulophyllum thalictroides) community

Maritime Forests — Dry to moist coastal forests mostly showing the effects of salt spray, with low stature, gnarled trees and numerous lianas.

Maritime Forests on Stabilized Dunes

Scarlet oak – Sassafras (*Quercus coccinea* - *Sassafras albidum*) woodlands

Maritime Forests on Other Upland Areas

Northern red oak / Flowering dogwood (*Quercus rubra*/*Cornus florida*) forests
American beech – White oak – Northern red oak – Tulip tree (*Fagus grandifolia* - *Quercus alba* -
Quercus rubra - *Liriodendron tulipifera*) community
Scarlet oak – Sassafras (*Quercus coccinea* - *Sassafras albidum*) woodlands
Pitch pine – Post oak (*Pinus rigida* - *Quercus stellata*) woodlands

Dry Acidic Forests — Poorly growing forests often dominated by oaks with various mixtures of pine, often with dwarf ericaceous shrubs.

Dry Oak Forests on Stratified Sand and Gravel

Northern red oak - Black oak – Chestnut oak (*Quercus rubra* - *Quercus velutina* - *Quercus prinus*) forests
Black oak – Chestnut oak / Black huckleberry (*Quercus velutina* - *Quercus prinus* /
Gaylussacia baccata) community
Black oak / Blue Ridge blueberry (*Quercus velutina* / *Vaccinium pallidum*) community
Pitch pine (*Pinus rigida*) woodlands
Pitch pine / Bear oak (*Pinus rigida* / *Quercus ilicifolia*) community
Pitch pine / Lowbush blueberry (*Pinus rigida* / *Vaccinium angustifolium*) community

APPENDIX II

Dry Pine Forests on Stratified Sand and Gravel

Pitch pine (*Pinus rigida*) woodlands

Pitch pine / Bear oak (*Pinus rigida* / *Quercus ilicifolia*) community

Pitch pine / Lowbush blueberry (*Pinus rigida* / *Vaccinium angustifolium*) community

Dry Acidic Forests on Glacial Till

Eastern hemlock (*Tsuga canadensis*) forests

Northern red oak - Black oak – Chestnut oak (*Quercus rubra* - *Quercus velutina* - *Quercus prinus*) forests

Black oak - Chestnut oak / Black huckleberry (*Quercus velutina* - *Quercus prinus* / *Gaylussacia baccata*) community

Black oak / Blue Ridge blueberry (*Quercus velutina* / *Vaccinium pallidum*) community

Dry Subacidic Forests — Slow-growing forests often dominated by white ash, hickories, and hophornbeam, with few shrubs and an open, grassy ground cover.

Sugar maple – Oak spp. (*Acer saccharum* - *Quercus* spp.) forests

Sugar maple – White ash / Roundlobe hepatica (*Acer saccharum* - *Fraxinus americana* / *Hepatica nobilis* var. *obtusata*) community

Pignut hickory – White ash (*Carya glabra* - *Fraxinus americana*) forests

Eastern redcedar (*Juniperus virginiana*) woodlands

Eastern redcedar / Poverty oatgrass (*Juniperus virginiana* / *Danthonia spicata*) community

Dry Circumneutral Forests — Dry, rich forests often dominated by oaks and maple, generally with a diverse herbaceous layer.

Sugar maple – Oak spp. (*Acer saccharum* - *Quercus* spp.) forests

Sugar maple – Chinkapin oak / Bristleleaf sedge (*Acer saccharum* - *Quercus muehlenbergii* / *Carex eburnea*) community

Sugar maple – White ash / Roundlobe hepatica (*Acer saccharum* - *Fraxinus americana* / *Hepatica nobilis* var. *obtusata*) community

Eastern redcedar (*Juniperus virginiana*) woodlands

Eastern redcedar / Hophornbeam (*Juniperus virginiana* / *Ostrya virginiana*) community

Mesic Acidic Forests — Well-developed forests, often with a dense high shrub layer and scattered herbs.

Mesic Acidic Forests on Stratified Sand and Gravel

Northern red oak / Flowering dogwood (*Quercus rubra* / *Cornus florida*) forests

Northern red oak / Mapleleaf viburnum (*Quercus rubra* / *Viburnum acerifolium*) community

Northern red oak – Yellow birch (*Quercus rubra* - *Betula alleghaniensis*) forests

Northern red oak – Yellow birch / Cinnamon fern (*Quercus rubra* - *Betula alleghaniensis* / *Osmunda cinnamomea*) community

Mesic Acidic Forests on Glaciolacustrine Silts and Clays

Northern red oak / Flowering dogwood (*Quercus rubra* / *Cornus florida*) forests

Northern red oak / Mapleleaf viburnum (*Quercus rubra* / *Viburnum acerifolium*) community

Northern red oak – Yellow birch (*Quercus rubra* - *Betula alleghaniensis*) forests

Northern red oak – Yellow birch / Cinnamon fern (*Quercus rubra* - *Betula alleghaniensis* / *Osmunda cinnamomea*) community

Mesic Acidic Forests on Glacial Till

Eastern hemlock (*Tsuga canadensis*) forests

Sugar maple – American beech – Yellow birch (*Acer saccharum* - *Fagus grandifolia* - *Betula alleghaniensis*) forests

Sugar maple – American beech / Hobblebush (*Acer saccharum* - *Fagus grandifolia* / *Viburnum alnifolia*) community

Sugar maple – American beech / Intermediate woodfern (*Acer saccharum* - *Fagus grandifolia* / *Dryopteris intermedia*) community

APPENDIX II

- Northern red oak / Flowering dogwood (*Quercus rubra* / *Cornus florida*) forests
- Northern red oak / Mapleleaf viburnum (*Quercus rubra* / *Viburnum acerifolium*) community
- American beech – White oak – Northern red oak – Tulip tree (*Fagus grandifolia* - *Quercus alba* - *Quercus rubra* - *Liriodendron tulipifera*) community
- Northern red oak – Yellow birch (*Quercus rubra* - *Betula alleghaniensis*) forests
- Northern red oak – Yellow birch / Cinnamon fern (*Quercus rubra* - *Betula alleghaniensis* / *Osmunda cinnamomea*) community

Mesic Circumneutral Forests – Well-developed forests, often with a dense high shrub layer and scattered herbs. These forests are poorly represented in Connecticut due to extensive conversion to agricultural uses.

- Eastern hemlock (*Tsuga canadensis*) forests

Cove Forests — Moist forests at the base of slopes where colluvium accumulates; generally dominated by sugar maple and white ash; nutrients provided by surface runoff.

- Sugar maple – White ash – American basswood (*Acer saccharum* - *Fraxinus americana* - *Tilia americana*) forests
- Sugar maple – White ash / Blue cohosh (*Acer saccharum* - *Fraxinus americana* / *Caulophyllum thalictroides*) community
- Sugar maple – White ash / New York fern (*Acer saccharum* - *Fraxinus americana* / *Thelypteris noveboracensis*) community

Seepage Forests — Moist forests at the base of slopes with groundwater discharge; generally dominated by sugar maple, white ash, and tulip poplar.

Acidic Seepage Forests

- Sugar maple – White ash – American basswood (*Acer saccharum* - *Fraxinus americana* - *Tilia americana*) forests
- Sugar maple – White ash / Silver false spleenwort (*Acer saccharum* - *Fraxinus americana* / *Deparia acrostichoides*) community

Circumneutral Seepage Forests

- Sugar maple – White ash – American basswood (*Acer saccharum* - *Fraxinus americana* - *Tilia americana*) forests
- Sugar maple – White ash / Blue cohosh (*Acer saccharum* - *Fraxinus americana* / *Caulophyllum thalictroides*) community
- Sugar maple – White ash / New York fern (*Acer saccharum* - *Fraxinus americana* / *Thelypteris noveboracensis*) community

Alluvial Forests — Mesic forests influenced by seasonal inundation, mostly with well-drained, nutrient-rich soils.

Floodplain Forests

- Sugar maple – Bitternut hickory (*Acer saccharum* - *Carya cordiformis*) temporarily flooded forests
- Sugar maple – White ash / Sprengel's sedge (*Acer saccharum* - *Fraxinus americana* / *Carex sprengei*) community
- Sugar maple – Eastern cottonwood (*Acer saccharinum* - *Populus deltoides*) temporarily flooded forests
- Sugar maple / Smallspike false nettle (*Acer saccharinum* / *Boehmeria cylindrica*) community
- Sugar maple / Sensitive fern (*Acer saccharinum* / *Onoclea sensibilis*) community
- Sugar maple / White snakeroot (*Acer saccharinum* / *Ageratina altissima*) community
- Pin oak – Green ash (*Quercus palustris* - *Fraxinus pennsylvanica*) temporarily flooded forests
- American sycamore – Boxelder (*Platanus occidentalis* - *Acer negundo*) temporarily flooded forests

Palustrine System — Nonforested communities

Palustrine Aquatic Beds — Floating or submerged aquatic beds; often rooted in shallow water.

- Riverweed (*Podostemum ceratophyllum*) permanently flooded vegetation

APPENDIX II

- Variegated yellow pond-lily (*Nuphar lutea* ssp. *variegata*) permanently flooded vegetation
 - Variegated yellow pond-lily – American white waterlily (*Nuphar lutea* ssp. *variegata* – *Nymphaea odorata*) community
- Coon's tail – Canadian waterweed (*Ceratophyllum demersum* – *Elodea canadensis*) permanently flooded vegetation
- Tapegrass (*Vallisneria americana*) permanently flooded vegetation
 - Tapegrass (*Vallisneria americana*) community

Pond and Lake Shores — Seasonally exposed sandy, gravelly, or muddy sediments.

Acidic Pond and Lake Shores

- Black willow (*Salix nigra*) temporarily flooded shrublands
 - Black willow / Fall panicgrass (*Salix nigra* / *Panicum dichotomiflorum*) community
- Speckled alder (*Alnus incana* ssp. *rugosa*) temporarily flooded shrublands
 - Speckled alder – Willow (*Alnus incana* ssp. *rugosa* - *Salix* spp.) community
- Swamp loosestrife (*Decodon verticillatus*) semipermanently flooded shrublands
- Reed canarygrass (*Phalaris arundinacea*) temporarily flooded grasslands
- Bluejoint (*Calamagrostis canadensis*) temporarily flooded grasslands
 - Bluejoint – Bog white violet (*Calamagrostis canadensis* - *Viola lanceolata*) community
- Tussock sedge (*Carex stricta*) seasonally flooded grasslands
- Common reed (*Phragmites australis*) temporarily flooded grasslands
- Threeway sedge (*Dulichium arundinacea*) semipermanently flooded grasslands
 - Threeway sedge – Earth loosestrife (*Dulichium arundinacea* - *Lysimachia terrestris*) community
- Green arrow arum – Lizard's tail (*Peltandra virginica* - *Saururus cernuus*) semipermanently flooded forb vegetation
- Pickernelweed – Green arrow arum (*Pontederia cordata* - *Peltandra virginica*) semipermanently flooded forb vegetation
- Common meadowbeauty (*Rhexia virginica*) intermittently exposed forb vegetation
 - Common meadowbeauty – Golden hedgehyssop (*Rhexia virginica* - *Gratiola aurea*) community
 - Common meadowbeauty - Panicgrass (*Rhexia virginica* - *Panicum* spp.) community
- Sevenangle pipewort – Dortmann's cardinalflower (*Eriocaulon aquaticum* - *Lobelia dortmanna*) intermittently exposed forb vegetation

Circumneutral Pond and Lake Shores

- Tussock sedge (*Carex stricta*) seasonally flooded grasslands
- Hairy sedge – Cattail (*Carex lacustris* - *Typha* spp.) seasonally flooded grasslands

Riverbank Communities — Flood-scoured rocky or gravelly riverbanks with annual or perennial vegetation.

Riverbank Beaches/Shores

- Black willow (*Salix nigra*) temporarily flooded shrublands
 - Black willow / Fall panicgrass (*Salix nigra* / *Panicum dichotomiflorum*) community
- Speckled alder (*Alnus incana* ssp. *rugosa*) temporarily flooded shrublands
 - Speckled alder – Willow (*Alnus incana* ssp. *rugosa* - *Salix* spp.) community
- Big bluestem (*Andropogon gerardii*) temporarily flooded grasslands
 - Big bluestem – Bluebell bellflower (*Andropogon gerardii* - *Campanula rotundifolia*) community
- Twisted sedge (*Carex torta*) temporarily flooded grasslands

Riverside Seeps

- Inland sedge – Bristlystalked sedge - Yellow sedge (*Carex interior* - *Carex leptalea* - *Carex flava*) saturated grasslands
 - Dioecious sedge / Shrubby cinquefoil (*Carex sterilis* / *Dasiphora floribunda*) community
 - Dioecious sedge / Gray dogwood (*Carex sterilis* / *Cornus racemosa*) community

Alluvial Marshes — Open wetlands periodically inundated by adjacent rivers or streams, influenced by runoff from adjacent upland; peat accumulation minimal.

APPENDIX II

Narrowleaf cattail (*Typha latifolia*) semipermanently flooded grasslands
Common reed (*Phragmites australis*) temporarily flooded grasslands
Green arrow arum – Lizard’s tail (*Peltandra virginica* - *Saururus cernuus*) semipermanently flooded forb vegetation

Basin Marshes — Open wetlands found in glacial kettles or other topographically defined basins.

Swamp loosestrife (*Decodon verticillatus*) semipermanently flooded shrublands
Tussock sedge (*Carex stricta*) seasonally flooded grasslands

Spring Fens — Naturally open wetlands occupying groundwater discharge sites; peat accumulation minimal.

Acidic Spring Fens

American golden saxifrage (*Chrysosplenium americanum*) saturated forb vegetation

Circumneutral Spring Fens

Inland sedge – Bristlystalked sedge – Yellow sedge (*Carex interior* - *Carex leptalea* - *Carex flava*) saturated grasslands

Dioecious sedge / Shrubby cinquefoil (*Carex sterilis* / *Dasiphora floribunda*) community

Dioecious sedge / Gray dogwood (*Carex sterilis* / *Cornus racemosa*) community

Topogenic Peatlands — Natural peatlands occupying topographically defined basins; influenced by groundwater; on deep, poorly decomposed peats.

Rich Fens — Peatlands influenced by base-rich waters

Shrubby cinquefoil (*Dasiphora floribunda*) seasonally flooded shrublands

Shrubby cinquefoil – Bog birch / Hairy sedge (*Dasiphora floribunda* - *Betula pumila* / *Carex lacustris*) community

Shrubby cinquefoil – Sageleaf willow – Silky dogwood / Tussock sedge (*Dasiphora floribunda* - *Salix candida* - *Cornus amomum* / *Carex stricta*) community

Shrubby cinquefoil – Sweetgale / Woollyfruit sedge – Smooth sawgrass (*Dasiphora floribunda* - *Myrica gale* / *Carex lasiocarpa* - *Cladium mariscoides*) community

Woollyfruit sedge (*Carex lasiocarpa*) saturated grasslands

Woollyfruit sedge / Leatherleaf (*Carex lasiocarpa* / *Chamaedaphne calyculata*) community

Hardstem bulrush (*Schoenoplectus acutus*) semipermanently flooded grasslands

Medium Fens — Peatlands dominated by ericaceous shrubs and sedges, flooded by surface water.

Leatherleaf (*Chamaedaphne calyculata*) saturated dwarf-shrublands

Leatherleaf / Northwest Territory sedge (*Chamaedaphne calyculata* / *Carex utriculata* var. *rostrata*) community

Woollyfruit sedge (*Carex lasiocarpa*) saturated grasslands

Woollyfruit sedge – Water sedge (*Carex lasiocarpa* - *Carex aquatilis*) community

Twigrush (*Cladium mariscoides*) saturated grasslands

Twigrush – White beaksedge (*Cladium mariscoides* - *Rhynchospora alba*) community

Twigrush – Meager sedge (*Cladium mariscoides* - *Carex exilis*) community

Twigrush – Spoonleaf sundew – Beaked spikerush (*Cladium mariscoides* - *Drosera intermedia* - *Eleocharis rostellata*) community

White beaksedge (*Rhynchospora alba*) saturated grasslands

White beaksedge / Sphagnum (*Rhynchospora alba* / *Sphagnum cuspidatum*) community

Threeway sedge (*Dulichium aundinacea*) semipermanently flooded grasslands

Threeway sedge / Sphagnum moss (*Dulichium arundinacea* / *Sphagnum* spp.) community

Swamp loosestrife (*Decodon verticillatus*) semipermanently flooded shrublands

Bogs (poor fens) — Peatlands dominated by ericaceous shrubs, influenced by ground water.

Highbush blueberry (*Vaccinium corymbosum*) seasonally flooded shrublands

Highbush blueberry / Swamp azalea (*Vaccinium corymbosum* / *Rhododendron viscosum*) community

Leatherleaf (*Chamaedaphne calyculata*) saturated dwarf-shrublands

- Leatherleaf – Black spruce (*Chamaedaphne calyculata* - *Picea mariana*) community
- Leatherleaf – White beaksedge (*Chamaedaphne calyculata* - *Rhynchospora alba*) community
- Leatherleaf / Virginia marsh St. Johnswort (*Chamaedaphne calyculata* / *Triadenum virginicum*) community
- Black huckleberry (*Gaylussacia baccata*) saturated dwarf-shrublands
- Dwarf huckleberry (*Gaylussacia dumosa*) saturated dwarf-shrublands
- Sweetgale (*Myrica gale*) saturated dwarf-shrublands
- Sweetgale – White meadowsweet – Leatherleaf (*Myrica gale* – *Spiraea alba* - *Chamaedaphne calyculata*) community

Palustrine System — Forested communities

Basin Swamps — Forested and/or shrub swamps with stagnant or slow-moving water; in topographically defined basins; on decomposed peats and mucks.

Acidic Red Maple / Ericaceous Basin Swamps

- Red maple / Highbush blueberry (*Acer rubrum* / *Vaccinium corymbosum*) seasonally flooded forests
 - Red maple / Common winterberry – Highbush blueberry (*Acer rubrum* / *Ilex verticillata* - *Vaccinium corymbosum*) community
- Red maple – Pin oak (*Acer rubrum* - *Quercus palustris*) seasonally flooded forests
- Red maple (*Acer rubrum*) seasonally flooded woodlands
 - Red maple / Tussock sedge (*Acer rubrum* / *Carex stricta*) community
- Highbush blueberry (*Vaccinium corymbosum*) seasonally flooded shrublands
 - Highbush blueberry – Swamp azalea (*Vaccinium corymbosum* - *Rhododendron viscosum*) community
- Common buttonbush (*Cephalanthus occidentalis*) semipermanently flooded shrublands
 - Common buttonbush / Rattlesnake mannagrass (*Cephalanthus occidentalis* / *Glyceria canadensis*) community

Acidic Eastern Hemlock Basin Swamps

- Eastern hemlock (*Tsuga canadensis*) seasonally flooded forests

Acidic Atlantic White Cedar Basin Swamps

- Atlantic white cedar (*Chamaecyperis thyoides*) seasonally flooded forests
 - Atlantic white cedar / Swamp azalea (*Chamaecyperis thyoides* / *Rhododendron viscosum*) community
 - Atlantic white cedar – Red maple – Yellow birch (*Chamaecyperis thyoides* - *Acer rubrum* - *Betula alleghaniensis*) community
 - Atlantic white cedar / Great laurel (*Chamaecyperis thyoides* / *Rhododendron maximum*) community
- Atlantic white cedar (*Chamaecyperis thyoides*) saturated woodlands
 - Atlantic white cedar (*Chamaecyperis thyoides*) woodlands

Acidic Red/Black Spruce Basin Swamps

- Red spruce (*Picea rubens*) saturated forests
 - Red spruce / Common mountain holly (*Picea rubens* / *Nemopanthus mucronata*) community
- Black spruce (*Picea mariana*) saturated forests
 - Black spruce / Sheep laurel (*Picea mariana* / *Kalmia angustifolia*) community
- Black spruce (*Picea mariana*) saturated woodlands
 - Black spruce / Common mountain holly (*Picea mariana* / *Nemopanthus mucronata*) community

Circumneutral Maple/Ash Basin Swamps

- Red maple / Skunk cabbage (*Acer rubrum* / *Symplocarpus foetidus*) seasonally flooded forests
 - Red maple – Black ash / Bristly buttercup (*Acer rubrum* - *Fraxinus nigra* / *Ranunculus hispidus* var. *caricetorum*) community
 - Red maple – Northern spicebush (*Acer rubrum* / *Lindera benzoin*) community

APPENDIX II

Circumneutral Northern White Cedar Basin Swamps

Northern white cedar (*Thuja occidentalis*) seasonally flooded forests

Seepage Swamps — Swamps with flowing surface and/or telluric water, on gently sloping to sloping sites; peat accumulation minimal.

Acidic Seepage Swamps

Red maple / Skunk cabbage (*Acer rubrum* / *Symplocarpus foetidus*) seasonally flooded forests

Red maple – Black ash / Bristly buttercup (*Acer rubrum* - *Fraxinus nigra* / *Ranunculus hispidus* var. *caricetorum*) community

Red maple / Northern spicebush (*Acer rubrum* / *Lindera benzoin*) community

Circumneutral Seepage Swamps

Red maple / Skunk cabbage (*Acer rubrum* / *Symplocarpus foetidus*) seasonally flooded forests

Red maple – Black ash / Bristly buttercup (*Acer rubrum* - *Fraxinus nigra* / *Ranunculus hispidus* var. *caricetorum*) community

Red maple / Northern spicebush (*Acer rubrum* / *Lindera benzoin*) community

Red maple (*Acer rubrum*) seasonally flooded woodlands

Red maple / Hairy sedge (*Acer rubrum* / *Carex lacustris*) community

Alluvial Swamps — Swamps influenced by periodic flooding from adjacent rivers or streams, often influenced by runoff from the adjoining upland.

Silver maple – Eastern cottonwood (*Acer saccharinum* - *Populus deltoides*) temporarily flooded forests

Silver maple / Smallspike false nettle (*Acer saccharinum* / *Boehmeria cylindrica*) community

Silver maple / Sensitive fern (*Acer saccharinum* / *Onoclea sensibilis*) community

Silver maple / White snakeroot (*Acer saccharinum* / *Ageratina altissima*) community

Estuarine System

Estuarine Aquatic Beds — Floating or submerged aquatic beds; often rooted in shallow water.

Tapegrass (*Vallisneria americana*) permanently flooded vegetation

Tapegrass (*Vallisneria americana*) community

Horned Pondweed (*Zannichellia palustris*) permanently flooded vegetation

Widgeongrass (*Ruppia maritima*) permanently flooded vegetation

Eelgrass (*Zostera marina*) permanently flooded vegetation

Intertidal Flats — Irregularly and regularly exposed mud or sand with sparse or dense vegetation.

Freshwater Intertidal Flats

Awl-leaf arrowhead (*Sagittaria subulata*) tidally flooded forb vegetation

Awl-leaf arrowhead – Horned pondweed (*Sagittaria subulata* - *Zannichellia palustris*) community

Parker's pipewort (*Eriocaulon parkeri*) tidally flooded forb vegetation

Parker's pipewort – Dotted smartweed (*Eriocaulon parkeri* - *Polygonum punctatum*) community

Parker's pipewort – Dwarf St. Johnswort – Golden hedgehyssop (*Eriocaulon parkeri* - *Hypericum mutilum* - *Gratiola aurea*) community

Intertidal Beaches and Shores — Rock, gravel, and/or sandy shorelines where erosion and deposition are controlled by wave action and the diurnal rise and fall of the tides.

Saltwater Intertidal Beaches and Shores

American searocket (*Cakile edentula*) tidally flooded forb vegetation

American searocket – Lambsquarters (*Cakile edentula* - *Chenopodium album*) community

APPENDIX II

Brackish Intertidal Beaches and Shores

- Common threesquare (*Schoenoplectus pungens*) tidally flooded grasslands
- Common threesquare – Arrowhead (*Schoenoplectus pungens* - *Sagittaria* spp.) community
- Tidmarsh amaranth (*Amaranthus cannabinus*) tidally flooded forb vegetation

Freshwater Intertidal Beaches and Shores

- Common threesquare (*Schoenoplectus pungens*) tidally flooded grasslands
- Common threesquare – Arrowhead (*Schoenoplectus pungens* - *Sagittaria* spp.) community

Intertidal Marshes — Regularly and irregularly flooded marshes.

Salt Marshes

- Northern marshelder (*Iva frutescens*) tidally flooded shrublands
- Northern marshelder / Switchgrass (*Iva frutescens* / *Panicum virgatum*) community
- Switchgrass (*Panicum virgatum*) medium-tall grasslands
- Smooth cordgrass (*Spartina alterniflora*) tidally flooded grasslands
- Smooth cordgrass (*Spartina alterniflora*) community
- Saltmeadow cordgrass (*Spartina patens*) tidally flooded grasslands
- Saltmeadow cordgrass – Inland saltgrass (*Spartina patens* - *Distichlis spicata*) community
- Slender glasswort (*Salicornia europaea*) tidally flooded forb vegetation
- Slender glasswort – Smooth cordgrass (*Salicornia europaea* - *Spartina alterniflora*) community
- Virginia glasswort (*Salicornia virginica*) tidally flooded vegetation

Brackish Marshes

- Smooth cordgrass (*Spartina alterniflora*) tidally flooded grasslands
- Smooth cordgrass – Eastern lilaeopsis (*Spartina alterniflora* - *Lilaeopsis chinensis*) community
- Common threesquare (*Schoenoplectus pungens*) tidally flooded grasslands
- Common threesquare – Sturdy bulrush (*Schoenoplectus pungens* - *Schoenoplectus robustus*) community
- Narrowleaf cattail (*Typha angustifolia*) tidally flooded grasslands
- Narrowleaf cattail – Rosemallow (*Typha angustifolia* - *Hibiscus moscheutos*) community
- Saltmeadow cordgrass (*Spartina patens*) tidally flooded grasslands
- Saltmeadow cordgrass – Creeping bentgrass (*Spartina patens* - *Agrostis stolonifera*) community
- Common reed (*Phragmites australis*) temporarily flooded grasslands

Freshwater Tidal Marshes

- Speckled alder – Silky dogwood – Common winterberry (*Alnus incana* ssp. *rugosa* - *Cornus amomum* - *Ilex verticillata*) tidally flooded shrublands
- Annual wildrice (*Zizania aquatica*) tidally flooded grasslands
- Annual wildrice – Pickerelweed (*Zizania aquatica* - *Pontederia cordata*) community
- Sweetflag (*Acorus calamus*) tidally flooded grasslands
- River bulrush (*Schoenoplectus fluviatilis*) tidally flooded grasslands
- Hairy sedge (*Carex lacustris*) tidally flooded grasslands
- Hairy sedge – Bluejoint - Canada wildrye (*Carex lacustris* - *Calamagrostis canadensis* - *Elymus canadensis*) community
- Green arrow arum (*Peltandra virginica*) tidally flooded forb vegetation
- Green arrow arum – Strawcolored flatsedge (*Peltandra virginica* - *Cyperus strigosus*) community
- Sensitive fern (*Onoclea sensibilis*) tidally flooded forb vegetation
- Sensitive fern – River bulrush – Cattail (*Onoclea sensibilis* – *Schoenoplectus fluviatilis* - *Typha* spp.) community

Intertidal Swamps — Regularly flooded swamps dominated by woody shrubs and scattered trees.

Freshwater Intertidal Swamps

- Red maple – Green ash (*Acer rubrum* - *Fraxinus pennsylvanica*) tidally flooded woodlands
- Red maple – Green ash / Knotweed (*Acer rubrum* - *Fraxinus pennsylvanica* / *Polygonum* spp.) community



APPENDIX III**Soil Drainage and Moisture Classes****Natural Drainage Classes** (adapted from USDA 1993)**excessively drained**

Water is removed very rapidly. The occurrence of internal free water commonly is very rare or very deep. The soils are commonly coarse-textured and have very high hydraulic conductivity or are very shallow.

somewhat excessively drained

Water is removed from the soil rapidly. Internal free water occurrence commonly is very rare or very deep. The soils are commonly coarse-textured and have high saturated hydraulic conductivity or are very shallow.

well drained

Water is removed from the soil readily but not rapidly. Internal free water occurrence commonly is deep or very deep; annual duration is not specified. Water is available to plants throughout most of the growing season in humid regions. Wetness does not inhibit growth of roots for significant periods during most growing seasons. The soils are mainly free of the deep to redoximorphic features that are related to wetness (gleying and mottling).

moderately well drained

Water is removed from the soil somewhat slowly during some periods of the year. Internal free water occurrence commonly is moderately deep and transitory, though permanent. The soils are wet for only a short time within the rooting depth during the growing season, but long enough that most mesophytic crops are affected. These soils commonly have a moderately low or lower saturated hydraulic conductivity in a layer within the upper one meter, periodically receive high rainfall, or both.

somewhat poorly drained

Water is removed slowly, so that the soil is wet at a shallow depth for significant periods during the growing season. The occurrence of internal free water commonly is shallow to moderately deep and transitory to permanent. Wetness markedly restricts the growth of mesophytic crops, unless artificial drainage is provided. The soils commonly have one or more of the following characteristics: low or very low saturated hydraulic conductivity, a high water table, additional water from seepage, or nearly continuous rainfall.

poorly drained

Water is removed so slowly that the soil is wet at shallow depths periodically during the growing season or remains wet for long periods. The occurrence of internal free water is shallow or very shallow and common or persistent. Free water is commonly at or near the surface long enough during the growing season so that most mesophytic crops cannot be grown, unless the soil is artificially drained. The soil, however, is not continuously wet directly below plow-depth. Free water at shallow depth is usually present. This water table is commonly the result of low or very low saturated hydraulic conductivity or nearly continuous rainfall, or of a combination of these.

very poorly drained

Water is removed from the soil so slowly that free water remains at or very near the ground surface during much of the growing season. The occurrence of internal free water is very shallow and persistent or permanent. Unless the soil is artificially drained, most mesophytic crops cannot be grown. The soils are commonly level or depressed and frequently ponded. If rainfall is high or nearly continuous, slope gradients may be greater.

Soil Moisture Classes (Damman 1976)

extremely dry

Rockpiles, gravel, steep eroding sands.

very dry

Shallow soils and medium or coarse sands, not influenced by groundwater.

dry

Deep silty sands and loamy sands, not influenced by groundwater.

well drained

Deep sandy loams and loams, not influenced by groundwater.

somewhat moist

Loams and sandy loams with some rust mottling in lower part of B or C horizon.

moist

Soil surface above the maximum water level; normal soil profile development hampered because of imperfect drainage. Upper 1-2 feet of soil well-aerated during vegetative season. Mineral soils with severely mottled to homogeneous brown horizon or heavy-textured soils with a perched water table.

somewhat wet

Maximum water level at soil surface for most of vegetative season. Anaerobic soils; on mineral soils, reduced gray soil matrix with rust mottling.

wet

Water level at soil surface for most of vegetative season. Reduced gley layer up to mineral soil surface on mineral soils; mottling usually absent or insignificant. Organic soil, gleyed mineral salt.

very wet

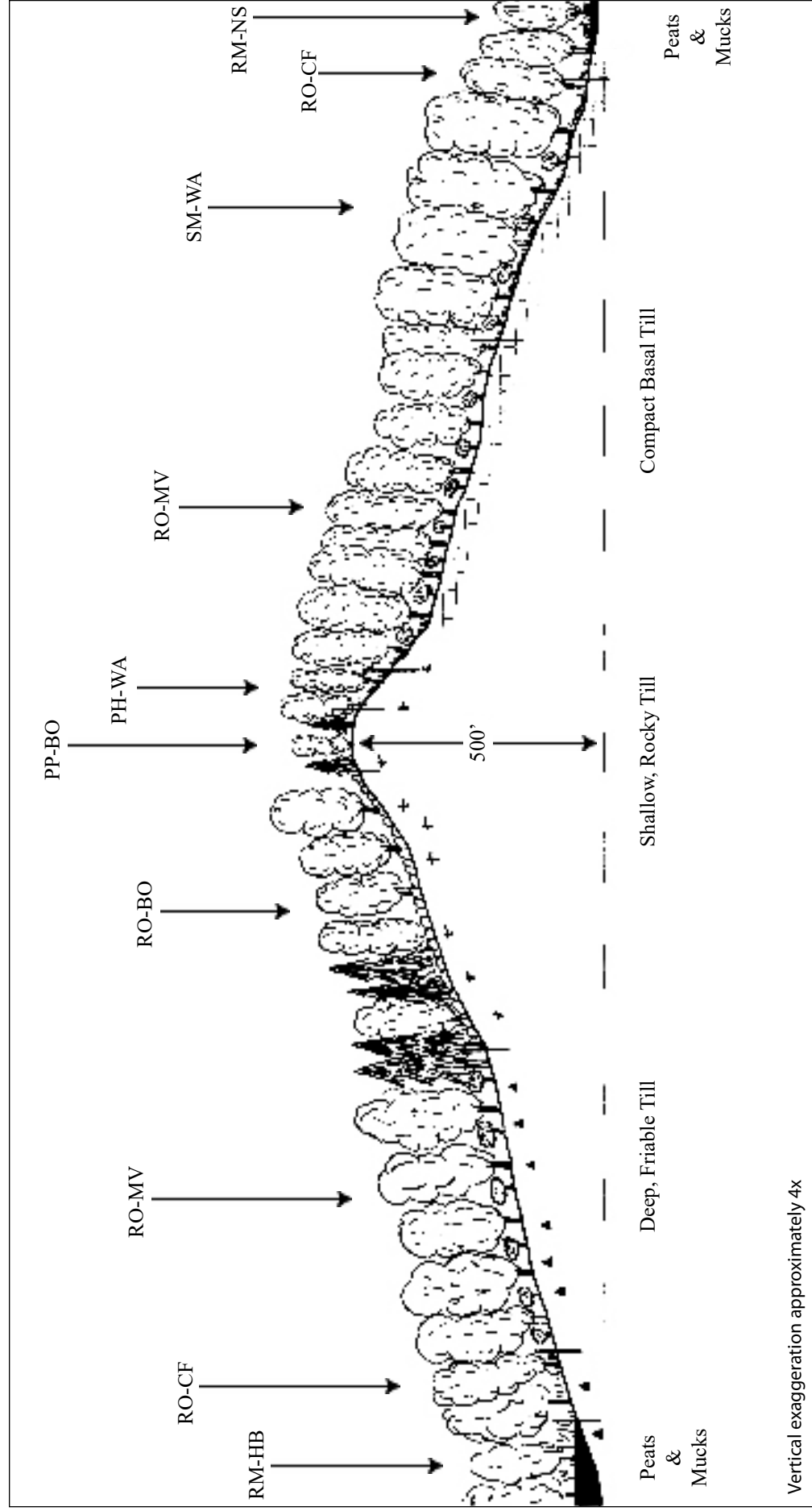
Water level above soil surface for most of vegetative season. Minimum water level approximately at soil surface. Organic soil.

permanently inundated

Minimum water level above soil surface; soils permanently inundated.

Typical Toposequences of Major Vegetation Types

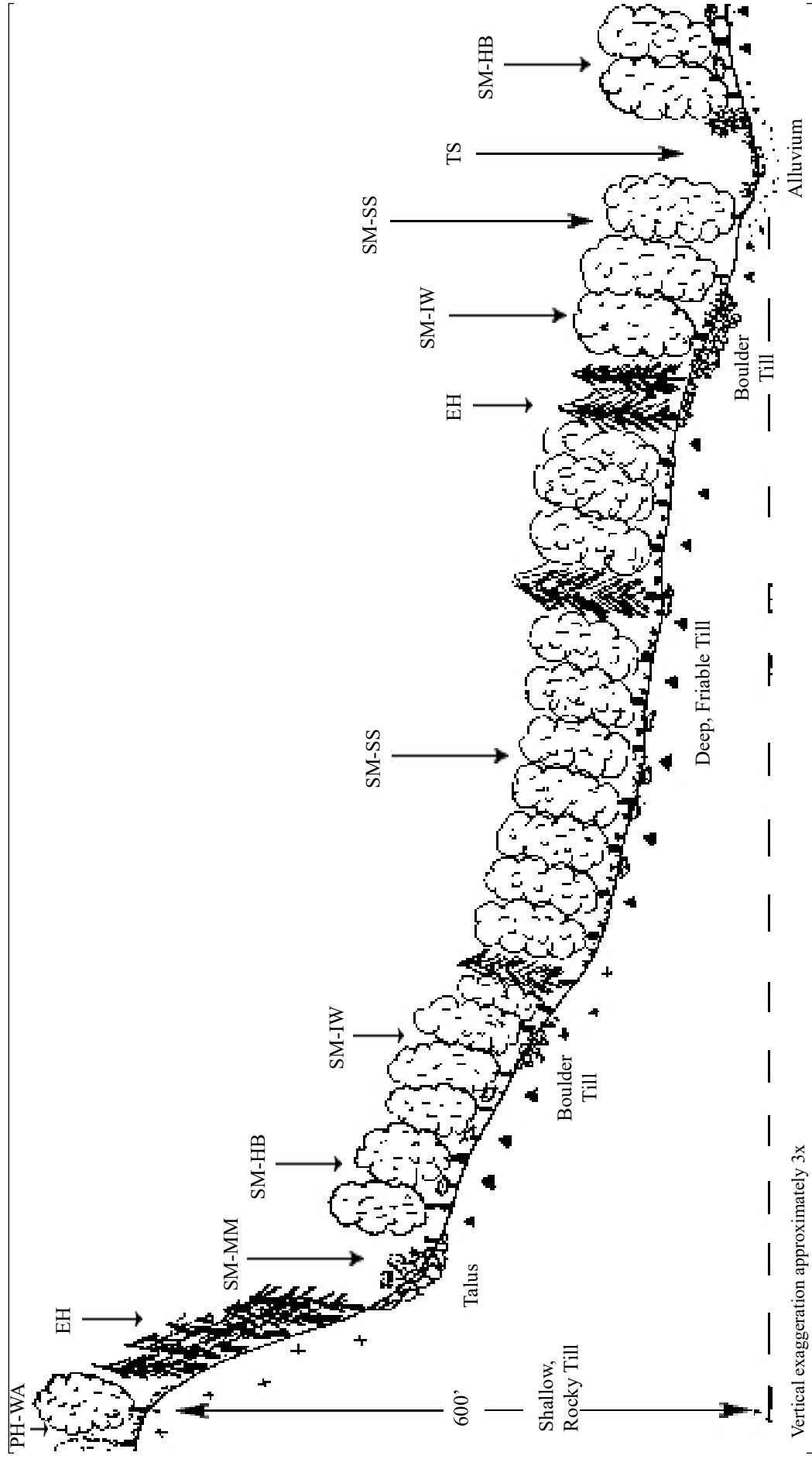
- 1) TOPOSEQUENCE OF VEGETATION TYPES ON BEDROCK-CONTROLLED HILLS IN EASTERN CONNECTICUT
- 2) TOPOSEQUENCE OF VEGETATION TYPES ON BEDROCK-CONTROLLED HILLS IN WESTERN CONNECTICUT
- 3) TOPOSEQUENCE OF VEGETATION TYPES IN GRAVEL-FILLED BASINS IN EASTERN CONNECTICUT
- 4) TOPOSEQUENCE OF VEGETATION TYPES ON STRATIFIED SANDS AND GRAVELS IN THE CONNECTICUT CENTRAL VALLEY
- 5) TOPOSEQUENCE OF VEGETATION TYPES ON GLACIAL LAKE SEDIMENTS IN THE CONNECTICUT CENTRAL VALLEY
- 6) TOPOSEQUENCE OF VEGETATION TYPES ON TRAP ROCK RIDGES IN THE CONNECTICUT CENTRAL VALLEY
- 7) SCHEMATIC TOPOSEQUENCE OF VEGETATION TYPES IN ACIDIC BOGS AND CALCAREOUS FENS
- 8) SCHEMATIC TOPOSEQUENCE OF VEGETATION TYPES ON THE CONNECTICUT RIVER FLOODPLAIN
- 9) SCHEMATIC TOPOSEQUENCE OF VEGETATION TYPES IN FRESHWATER TIDAL MARSHES
- 10) SCHEMATIC TOPOSEQUENCE OF VEGETATION TYPES IN BRACKISH TIDAL MARSHES
- 11) SCHEMATIC TOPOSEQUENCE OF VEGETATION TYPES IN SALT MARSHES
- 12) TOPOSEQUENCE OF VEGETATION TYPES ON COASTAL DUNES



1) Toposequence of vegetation types on bedrock-controlled hills in eastern Connecticut

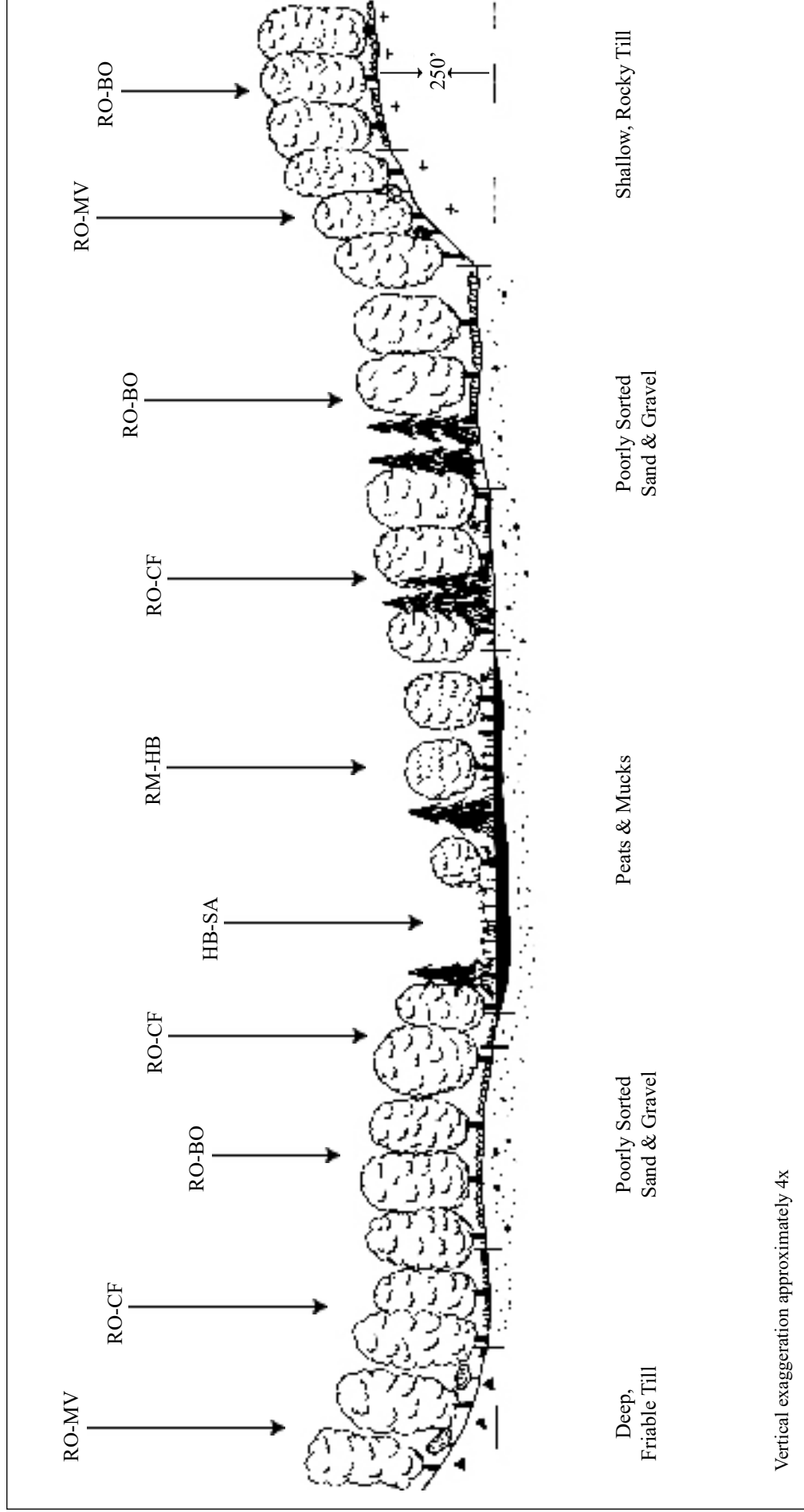
PH-WA (pitch pine / bear oak community), RM-HB (red maple / common winterberry - highbush blueberry community), RM-NS (red maple / northern spicebush community), RO-BO (northern red oak - black oak - chestnut oak forests), RO-CF (northern red oak / cinnamon fern community), RO-MV (northern red oak / mapleleaf viburnum community), SM-WA (sugar maple - white ash - American basswood forests)

APPENDIX IV



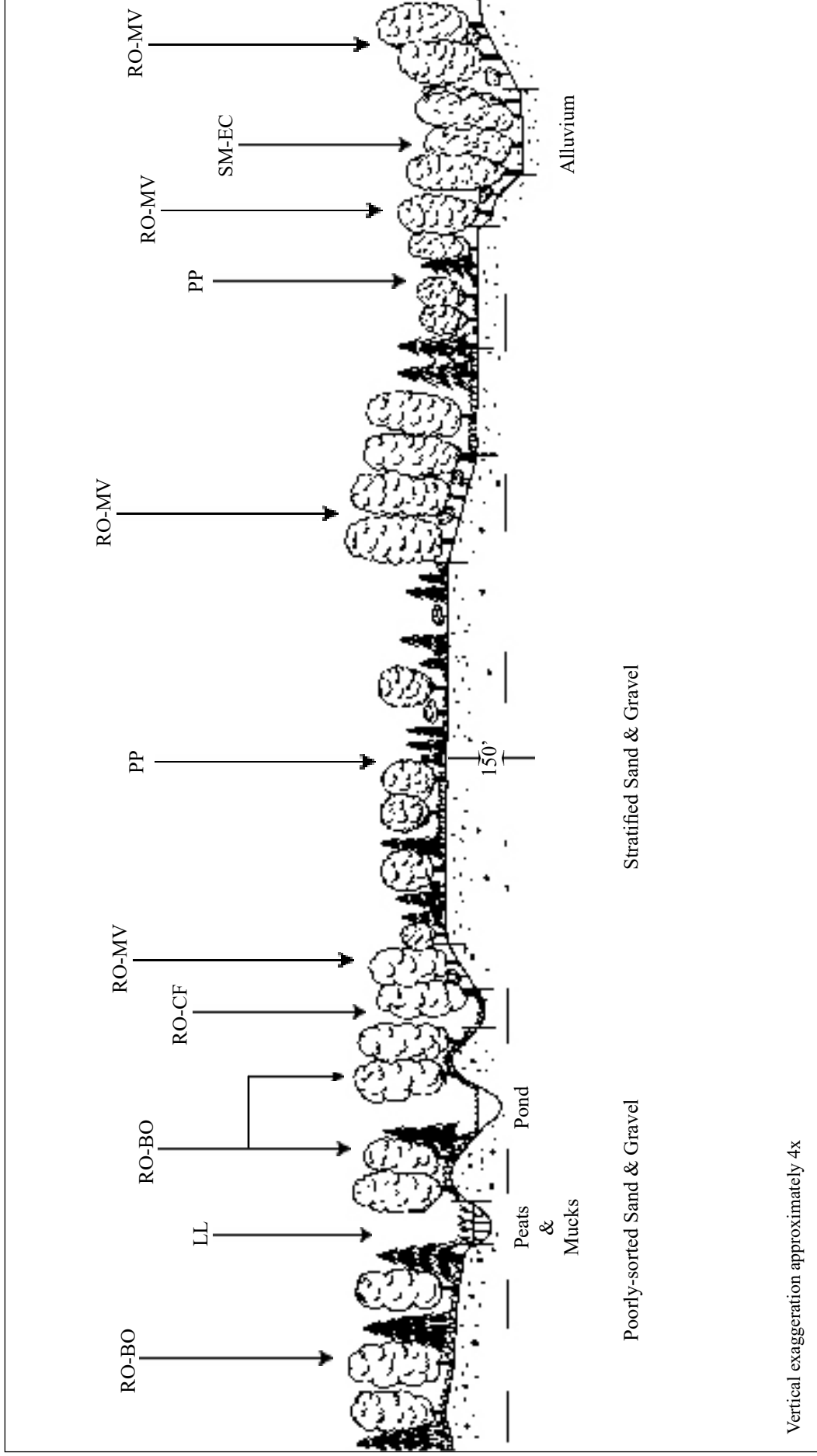
2) Toposequence of vegetation types on bedrock-controlled hills in western Connecticut

EH (Eastern hemlock forests), PH-WA (pignut hickory - white ash forests), SM-HB (American beech / hobblebush community), SM-IW (sugar maple - American beech / intermediate woodfern community), SM-MM (sugar maple - American basswood / mountain maple woodlands), SM-SS (sugar maple - white ash / silver false spleenwort community), TS (twisted sedge temporarily flooded community)



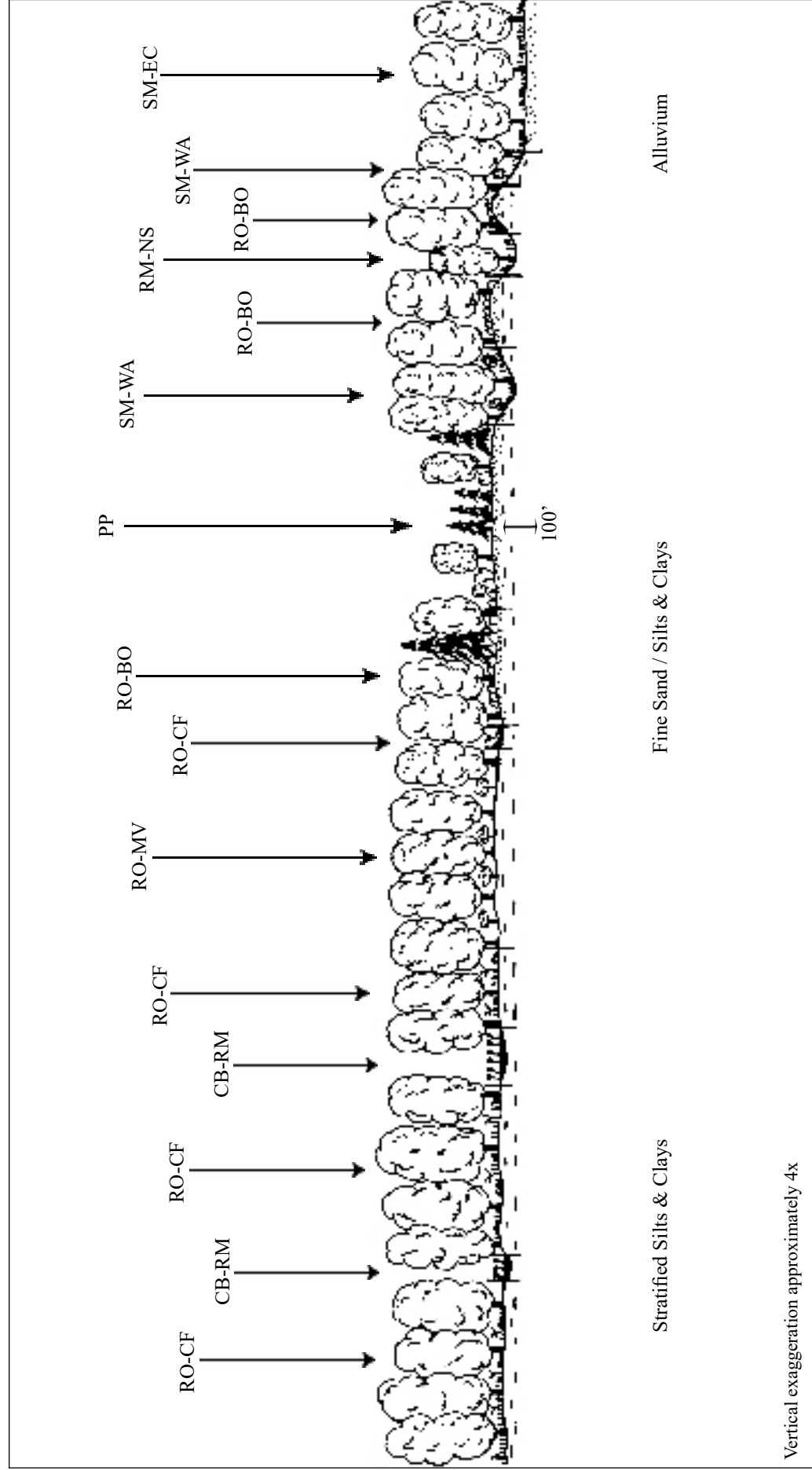
3) Toposequence of vegetation types in gravel-filled basins in eastern Connecticut

HB-SA (highbush blueberry - swamp azalea community), RM-HB (red maple / common winterberry - highbush blueberry community), RM-NS (red maple / northern spicebush community), RO-BO (northern red oak - black oak - chestnut oak forests), RO-CF (northern red oak / cinnamon fern community), RO-MV (northern red oak / mapleleaf viburnum community)



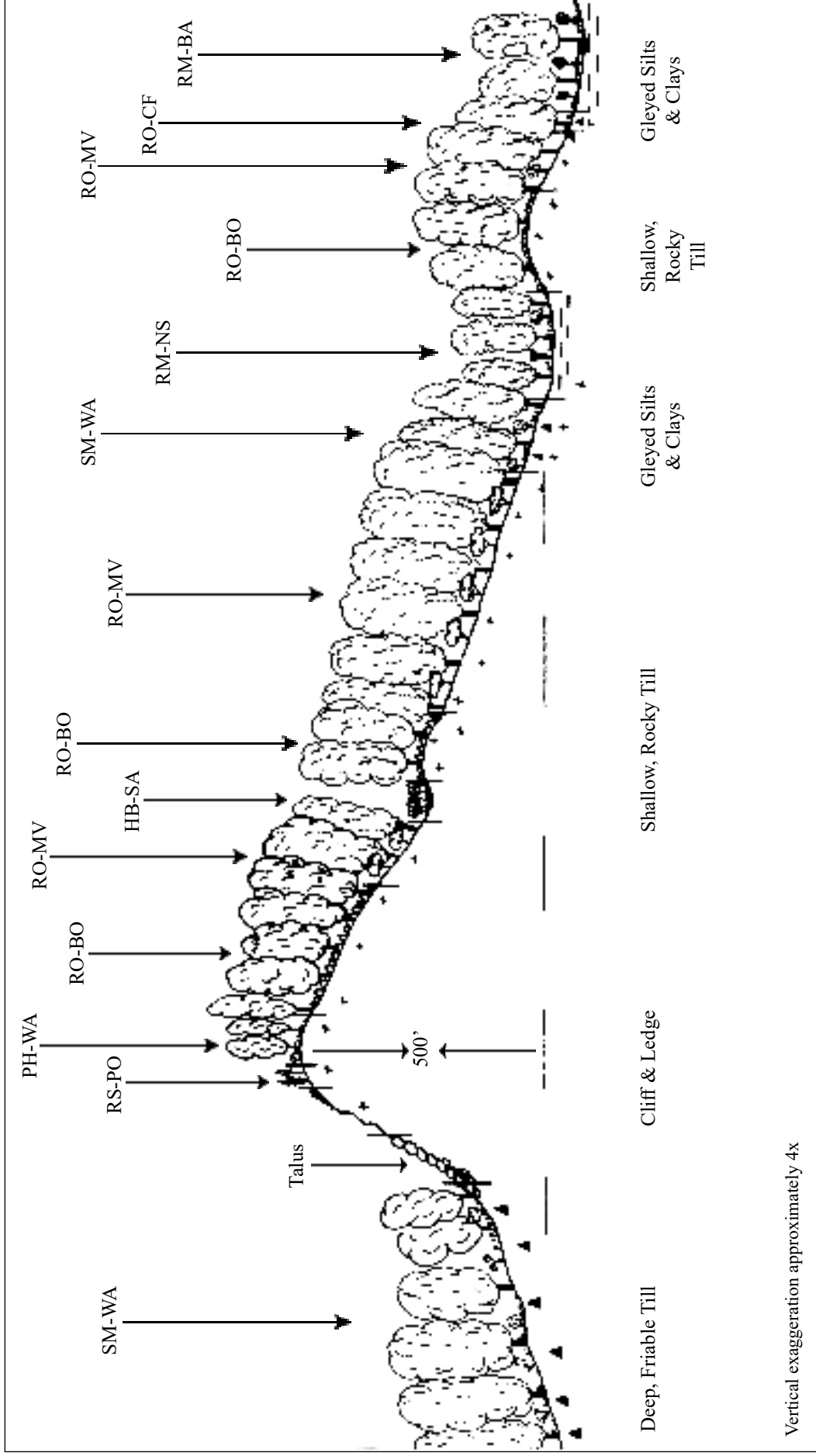
4) Toposequence of vegetation types on stratified sands and gravels in the Connecticut Central Valley

LL (leatherleaf saturated dwarf-shrublands), PP (pitch pine woodlands), RO-BO (northern red oak - black oak - chestnut oak forests), RO-CF (northern red oak / cinnamon fern community), RO-MV (northern red oak / mapleleaf viburnum community), SM-EC (silver maple - Eastern cottonwood temporarily flooded forests)



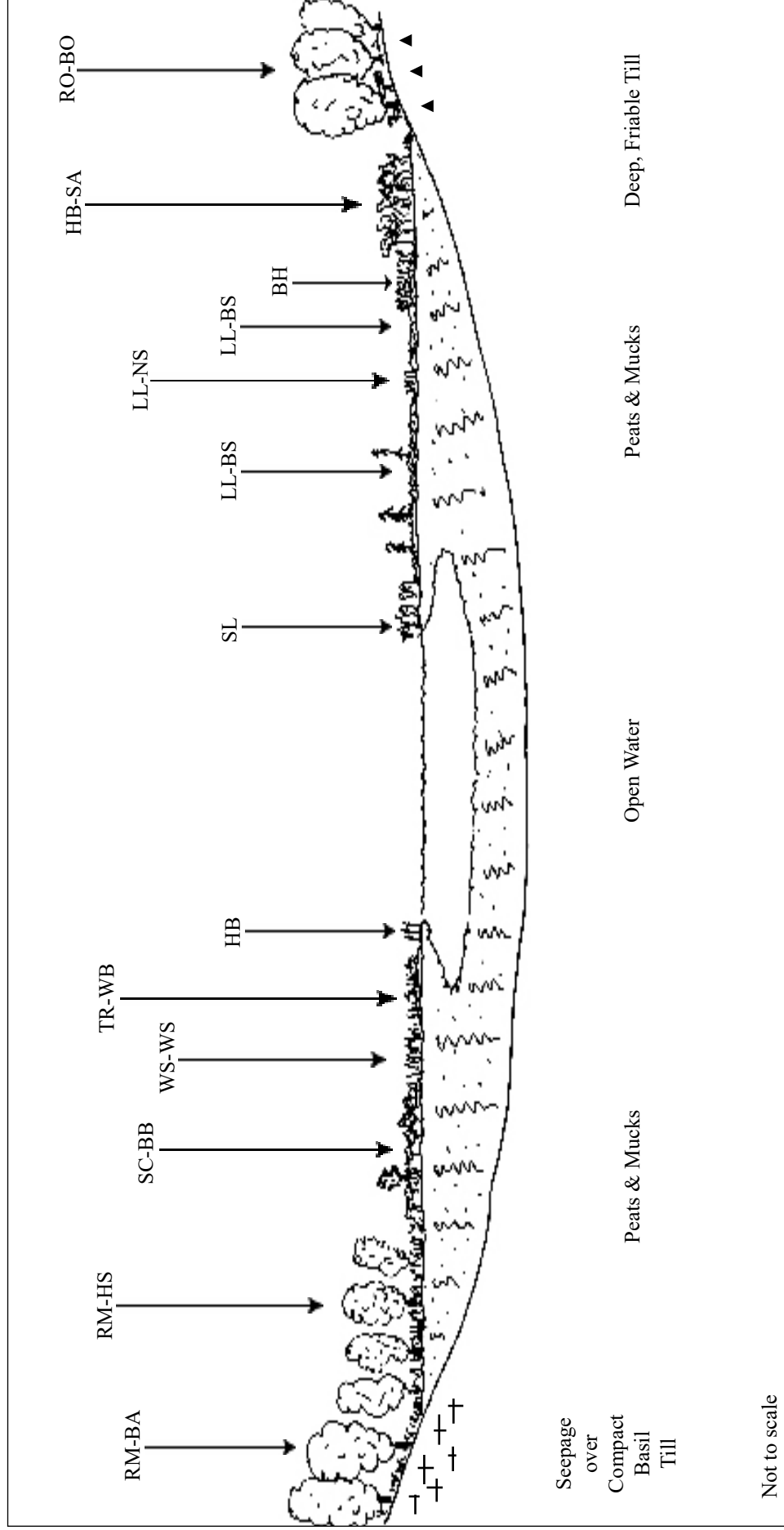
5) Toposequence of vegetation types on glacial lake sediments in the Connecticut Central Valley

CB-RM (common buttonbush / rattlesnake manna grass community), PP (pitch pine woodlands), RM-NS (red maple / northern spicebush community), RO-BO (northern red oak - black oak - chestnut oak forests), RO-CF (northern red oak / cinnamom fern community), RO-MV (northern red oak - mapleleaf viburnum community), SM-EC (sugar maple - Eastern cottonwood forests), SM-WA (sugar maple - white ash - American basswood forests)



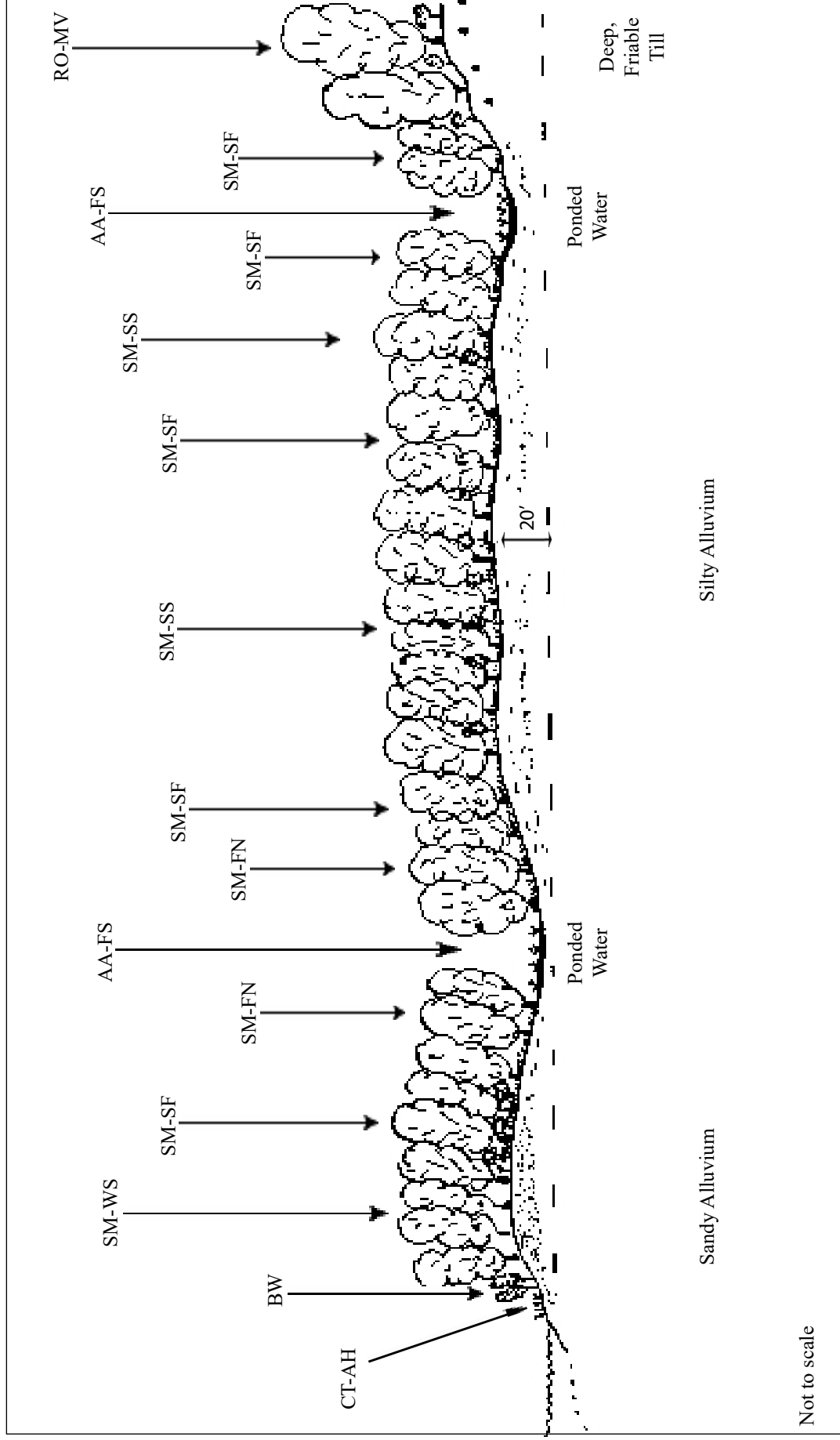
6) Toposequence of vegetation types on trap rock ridges in the Connecticut Central Valley

HB-SA (highbush blueberry - swamp azalea community), PH-WA (pignut hickory - white ash forests), RM-BA (red maple - black ash / bristly buttercup community), RM-NS (red maple / northern spicebush community), RO-BO (northern red oak - black oak - chestnut oak forests), RO-CF (northern red oak / cinnamon fern community), RO-MV (northern red oak / mapleleaf viburnum community), RS-PO (eastern redcedar / poverty oatgrass community), SM-WA (sugar maple - white ash - American basswood forests),



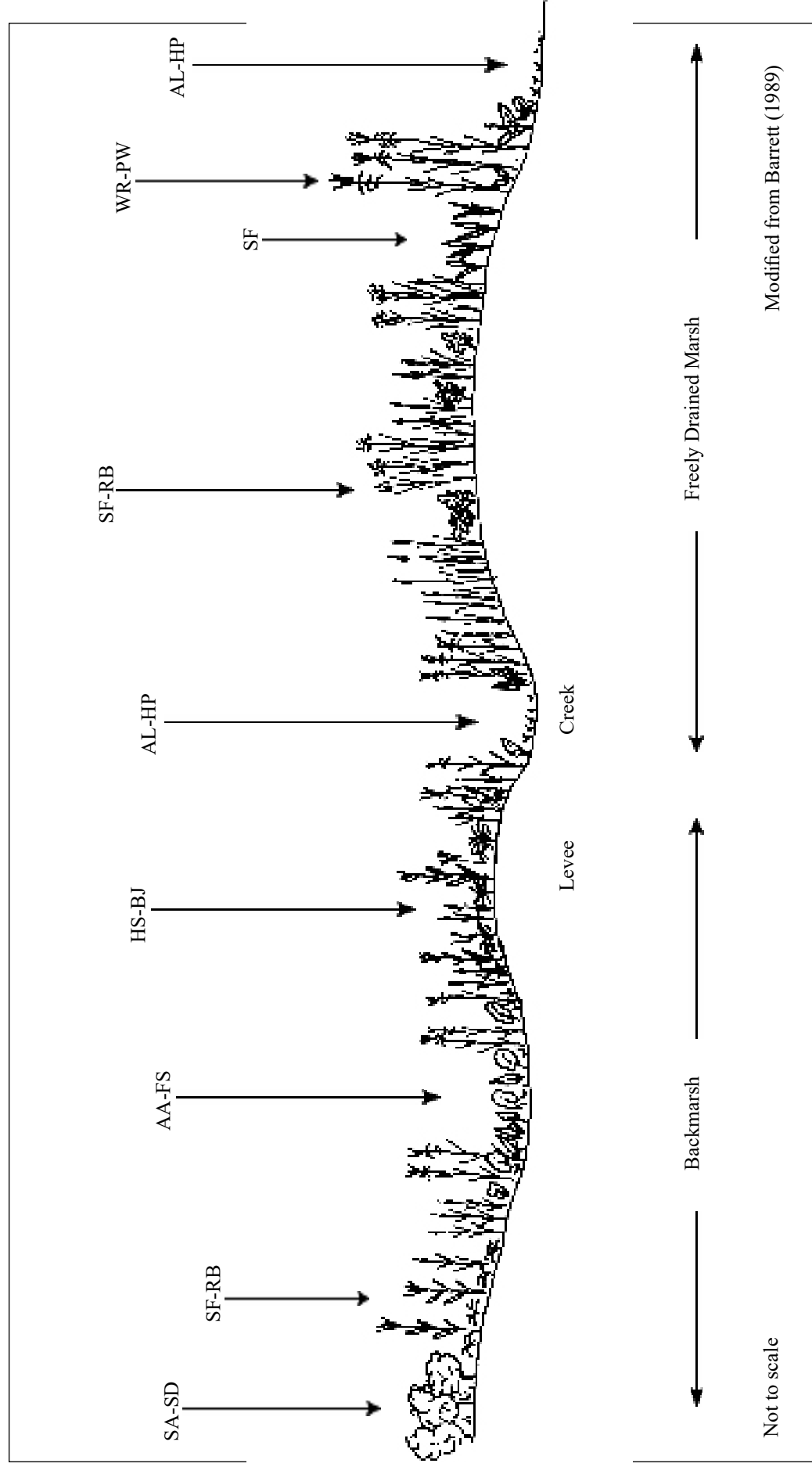
7) Schematic toposequence of vegetation types in acidic bogs (right) and calcareous fens (left)

BH (black huckleberry saturated dwarf-shrublands), HB (hardstem bulrush semipermanently flooded grasslands), HB-SA (highbush blueberry - swamp azalea community), LL-BS (leatherleaf / black spruce community), LL-NS (leatherleaf - Northwest Territory sedge community), RM-BA (red maple - black ash / bristly buttercup community), RM-HS (red maple - hairy sedge community), RO-BO (northern red oak - black oak - chestnut oak forests), SC-BB (shrubby cinquefoil - bog community), WS-WS (woolyfruit sedge - water sedge community), TR-WB (twigrush - white beaksedge community)



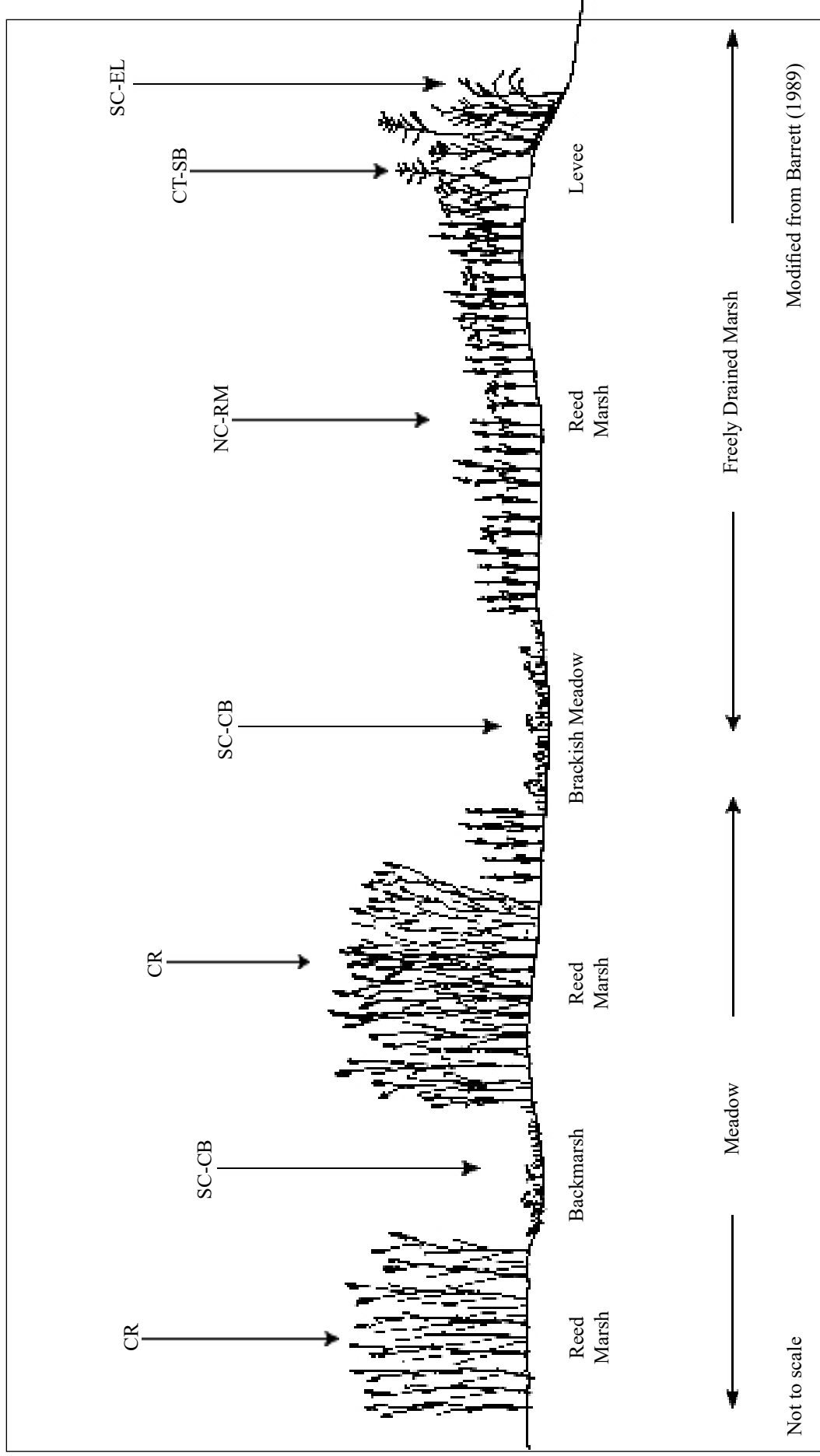
8) Schematic toposequence of vegetation types on the Connecticut River floodplain

AA-FS (green arrow arum - straw colored flatsedge community), BW (blackwillow temporarily flooded shrublands), CT-AH (common threesquare - arrowhead community), RO-MV (northern red oak / mapleleaf viburnum community), SM-FN (silver maple / smallspike false nettle community), SM-SF (silver maple / sensitive fern community), SM-SS (sugar maple - white ash / Sprengel's sedge community), SM-WF (straw colored flatsedge community), SM-WF (straw colored flatsedge community)



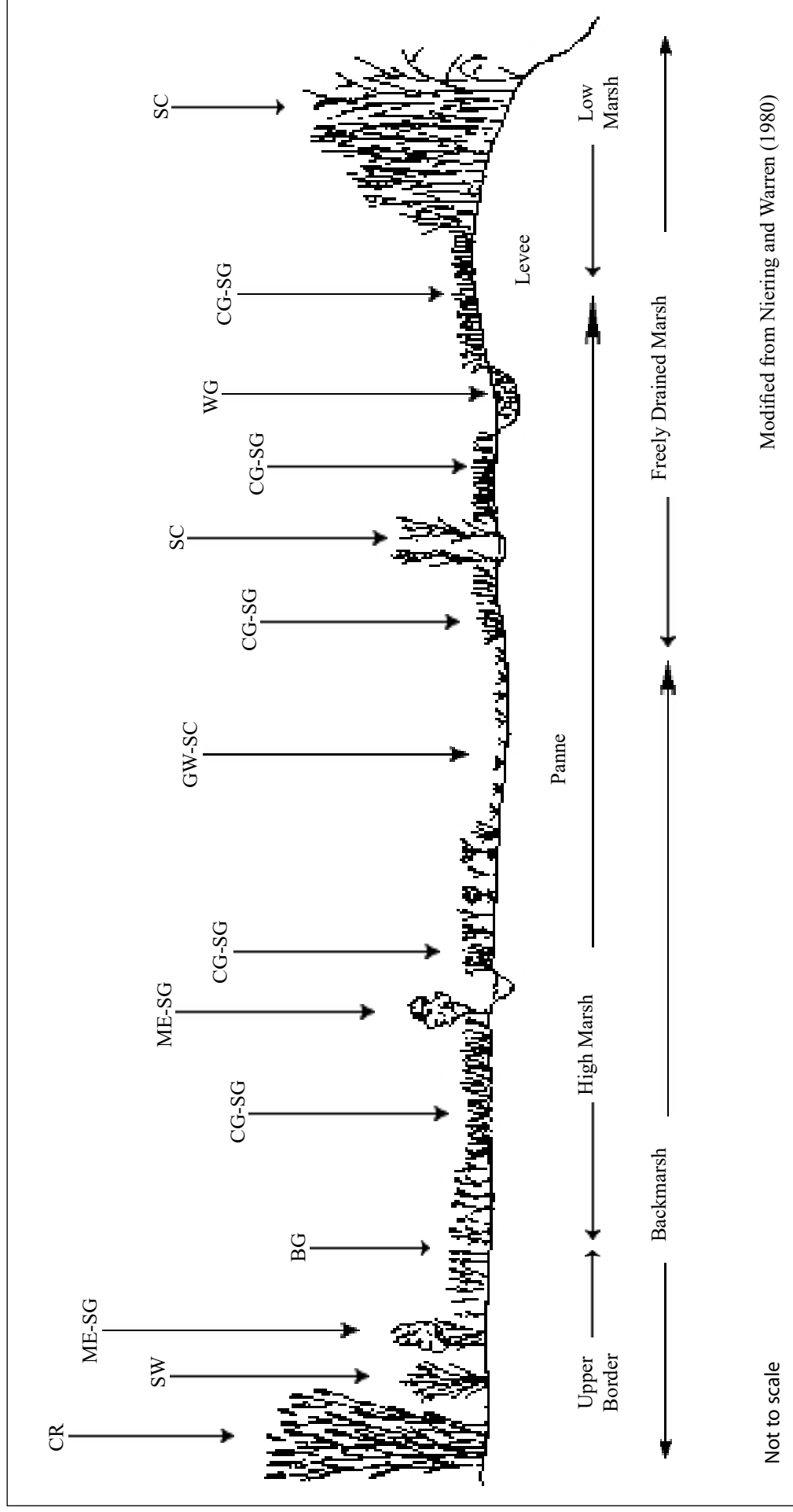
9) Schematic toposequence of vegetation types in freshwater tidal marshes

AA-FS (green arrow arum - straw colored flatsedge community), AL-HP (awl-leaf arrowhead - horned pondweed community), HS-BJ (hairy sedge - bluejoint - Canada wildrye community), SA-SD (speckled alder - silky dogwood - common winterberry tidally flooded shrublands), SF (sweetflag tidally flooded grasslands), SF-RB (sensitive fern - river bush - cattail community), WR-PW (annual wildrice - pickerelweed community)



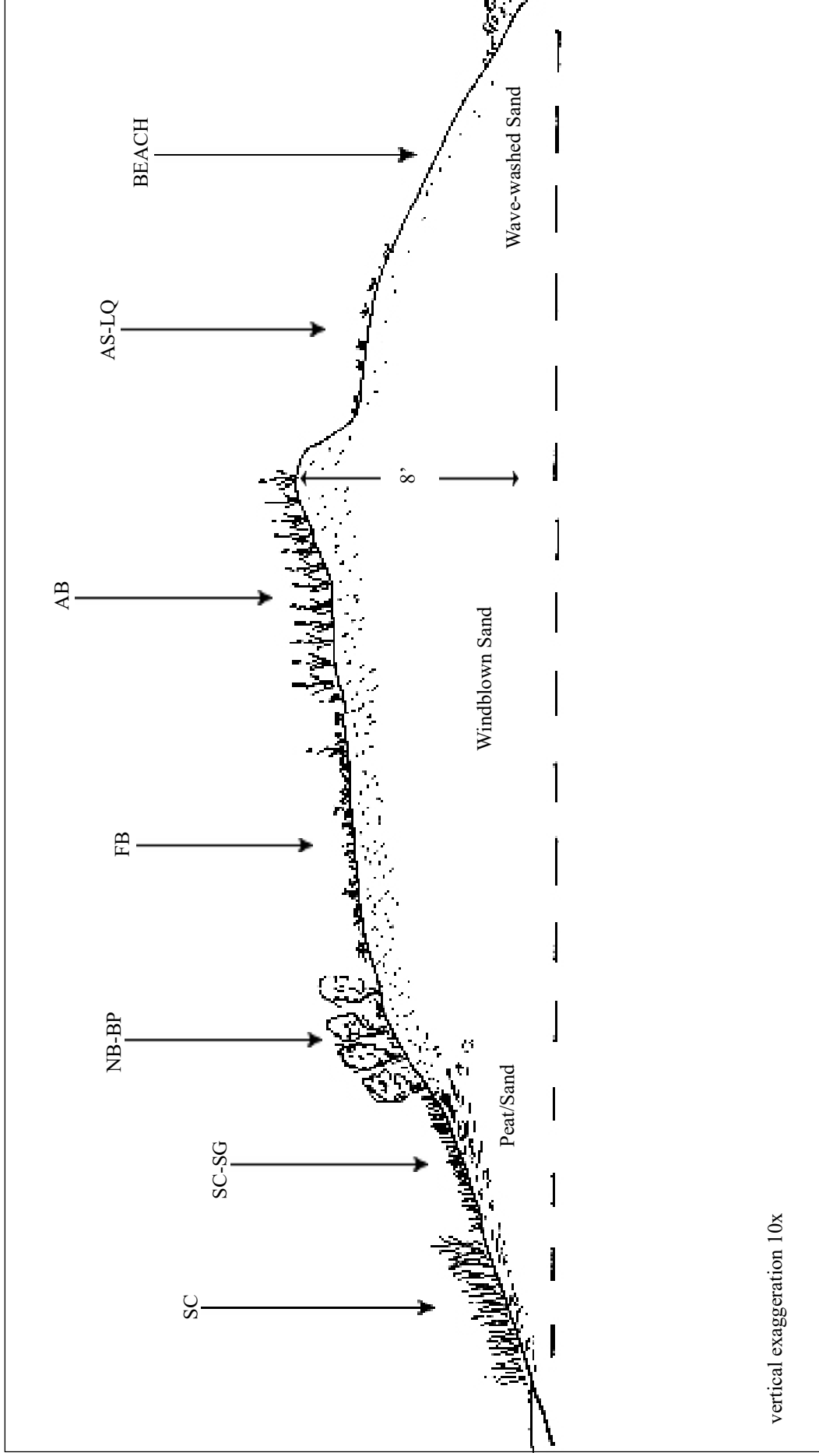
10) Schematic toposequence of vegetation types in brackish tidal marshes

CR (common reed tall grassland), CT-SB (common threesquare - sturdy bulrush community), NC-RM (narrow/leaf cattail - rosemallow community), SC-CB (saltmeadow cordgrass - creeping bentgrass community), SC-EL (smooth cordgrass - eastern iliaeopsis community)




11) Schematic toposesquence of vegetation types in salt marshes

BG (black grass variant), CG-SG (saltmeadow cordgrass - spike-grass community), CR (common reed tall grasslands), GW-SC (slender glasswort - smooth cordgrass community), ME-SG (slender glasswort - smooth cordgrass community), SC (smooth cordgrass community), SW (switchgrass medium tall grasslands), WG (wideongrass permanently flooded vegetation)



12) Toposequence of vegetation types on coastal dunes

AB (American beachgrass medium-tall grasslands), AS-LQ (American searocket - lambsquarters community), FB (false beachheather dwarf-shrublands), NB-BP (north-ern bayberry - beach plum shrublands), SC (smooth cordgrass community), SC-SG (saltmeadow cordgrass - spike-grass community)



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