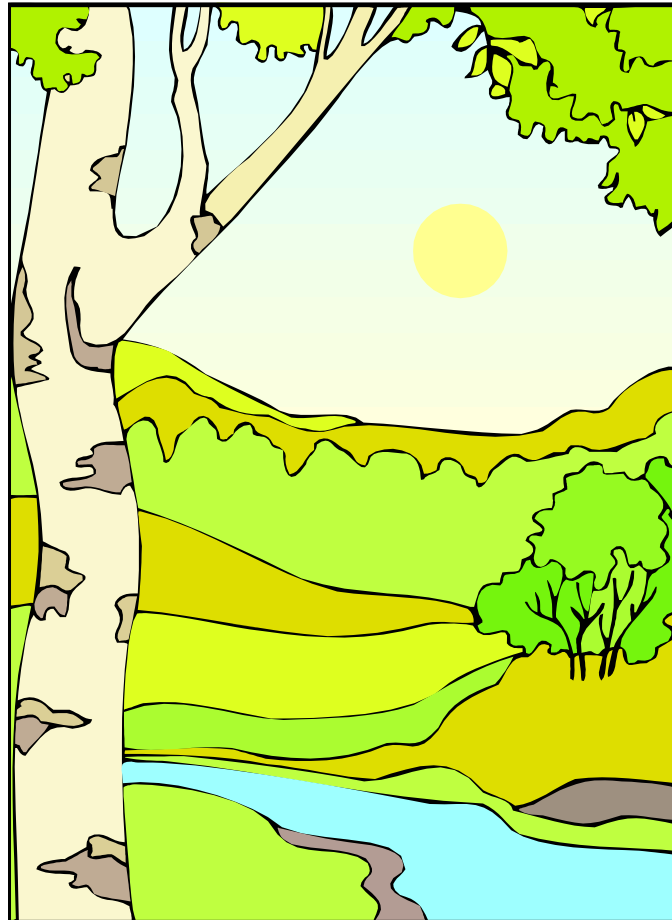


A Guide to the Natural Communities of Massachusetts



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ABOUT THIS DOCUMENT

This guide builds upon a variety of efforts to classify and identify the natural communities of Massachusetts. Foremost is the Massachusetts Natural Heritage and Endangered Species Program's (NH&ESP) draft *Classification of the Natural Communities of Massachusetts* (Swain and Kearsley 2001), the standard work for the Commonwealth. Although this classification offers extensive information on the State's 105 described natural communities, it provides no keys to assist in their identification. In 2002, Manomet Center for Conservation Sciences (Manomet) developed a natural communities guide based on the NH&ESP's classification. This guide contained a series of flow charts, dichotomous keys, and brief descriptions of natural communities. Recognizing the value of this tool, and the need for a similar one for the entire State, Manomet began expanding its guide to include communities beyond those in Southeastern Massachusetts. In 2004, Manomet was awarded a 3-year grant from the Massachusetts Environmental Trust to expand the guide to include all of Massachusetts, and to offer a series of Natural Community Identification Workshops. In 2004, Manomet's initial guide was expanded to include all of eastern Massachusetts. In 2005, the guide was again expanded to include all of Massachusetts.

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This guide builds upon the work of others. We thank the Massachusetts NH&ESP, especially Pat Swain and Jennifer Kearsley, for developing the State's natural communities classification system. We also wish to thank Pat for encouraging development of this guide, and patiently responding to our numerous e-mails and phone calls about the intricacies of natural communities. We also thank Kasey Rolih, of the University of Massachusetts, for providing insight into the separation of rock summit and outcrop, and cliff communities. We thank Tom O'Shea and John Scanlon of MassWildlife for providing information on Decision Rules used to classify vegetation on Wildlife Management Areas. Thanks also to those who field-tested the original version of this guide: Michele Simoneaux, Katie Konchar, Matt Mariola, Derek Martin, and Rachel Neugarten. Michele Simoneaux, Jennie Robbins, Eve Vidito and Beth Brazil all read and commented on earlier versions of this guide. We would also like to thank all those who participated in our workshops; responding to their questions and comments helped improve this guide. Finally, we wish to thank all those who use this guide to gather and share information on Massachusetts' natural communities, the State is better because of your efforts.

RECOMMENDED CITATION

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INTRODUCTION

A natural community is a distinct grouping of plant species that occur together in recurring patterns. They are distinguished by the three following characteristics (Sperduto and Nichols 2004):

1. definite plant species composition;
2. consistent physical structure (e.g., grassland, shrubland, forest); and
3. specific physical conditions (e.g., nutrients, climate).

Typically, natural communities are classified, described, and named on the basis of their dominant or characteristic vegetation.

There are a number of compelling reasons why natural communities should be identified and recorded. These include facilitating communication, identifying the distribution of organisms, informing local conservation planning, and conserving biological diversity. Ecologists, land managers, and others may communicate effectively and reach sound management decisions regarding ecological systems if they are using common terminology (Sperduto and Crowley 2001.) A standard natural community classification system provides such terminology. Because plants and animals may be associated with specific natural communities, information on the distribution of natural communities helps identify the likely distribution of plants and animals, both rare and common. Such distributional information helps inform conservation planning decisions. In Massachusetts, municipal Open Space and Recreation Plans must include a “General inventory” that mentions “important plants and plant communities that characterize the area” (Division of Conservation Services 2001.) A review of Open Space and Recreation Plans (Cavanagh and Simoneaux 2003) revealed that although 94% of plans stated that they contained natural community information, only 3% used the State’s official classification system (Swain and Kearsley 2001.) Because of this, information could not be compared among towns, prohibiting a regional approach to conservation. Such problems impede the conservation of Massachusetts’ biological diversity.

Conservation efforts in Massachusetts have typically focused on protecting populations of a target species or protecting hunting and fishing areas (Barbour et al. 1998). Although this approach contributes to biodiversity protection, it does not fully protect a “suite of plants and animals and the natural processes that maintain their habitats” (Barbour et al. 1998:26). The holistic protection of biodiversity requires the protection of examples of “...viable natural communities, especially functional assemblages of communities, that retain their full complement of native plants and animals.” By protecting natural communities we preserve those species of which we are already aware, as well as protect biodiversity that we know nothing about.

Preserving Massachusetts’ biodiversity requires protecting multiple viable examples of *all* natural community types. Such an approach “will require a coordinated and focused strategy involving all public and private conservation entities that are working to acquire land...” (Barbour et al. 1998:75). Although the most common of Massachusetts’ natural communities are already represented in protected lands, “the great majority of threatened and uncommon natural community types are not sufficiently protected.” True biodiversity conservation requires that

high-quality examples of these natural community types be protected, especially those that are threatened or presently under-protected in conservation lands. Documenting and conserving natural communities on private lands is also important, as 74% of all rare species and natural community occurrences in Massachusetts have been documented on private land (Barbour et al. 1998). Effective conservation of Massachusetts' biodiversity requires knowledge of the distribution, abundance, and quality of Massachusetts' natural communities. This knowledge currently does not exist.

Massachusetts' natural community classification was developed so that "a broad conservation audience including writers of town open space plans, land managers, environmental reviewers, and ecologists doing field studies" could record data by natural community type (Swain and Kearsley 2001), and these data be incorporated into conservation planning decisions. However, the State's official natural community classification system has not yet been widely adopted. Reasons for this include a lack of awareness of the system; the imposing amount of information in the classification (i.e., over 230 pages); and, perhaps most importantly, the absence of keys to identify natural communities. This guide and associated workshops are intended to address this situation by increasing awareness of the classification system and by providing keys and supporting information to permit users to easily, correctly, and consistently identify natural communities.

This guide and associated workshops are intended for conservation agents and conservation commissioners; open space committees; land managers and stewards; foresters, wetland consultants, and other environmental consultants; land trusts, watershed associations, and other conservation groups; and all others with an interest in conservation and a basic knowledge of plant identification.

Those collecting natural community information in the field are **strongly encouraged** to provide this information to their local open space committee, conservation commission, land trust, or other conservation interest (e.g., Manomet.) Observations of rare natural communities (i.e., those with a rank of S1-S3; see Page 4 for details) should be reported to the Massachusetts NH&ESP.

This guide is intended to increase awareness of Massachusetts' natural community classification system by providing keys and supporting information that permit you to easily, correctly, and consistently identify natural communities that you encounter.

USING THIS GUIDE

Natural communities may be identified through the use of flow charts, keys, and supporting information. These tools help work you through the classification hierarchy so that you may correctly identify the Natural Community Type. The five levels of the hierarchy are:

System

Sub-system

Community Group (*associated with most, but not all, Sub-systems*)

Community Sub-group (*associated with only 2 Community Groups*)

Community Type

(NOTE: The names of these hierarchical levels are based on terminology in Swain and Kearsley (2001.) They were developed specifically for this guide, as the NH&ESP has not yet assigned names to these levels. Heritage's terminology for the hierarchy, if different from terminology used in this guide, will be adopted when available.)

SYSTEM: To identify the Community Type, begin by identifying the System (i.e., Terrestrial, Palustrine, or Estuarine) in which the community that you wish to identify occurs. (*Definitions of these terms and others may be found in the Glossary, beginning on page 124.*) Once you have identified the System of the community in question, go to the corresponding flow chart to further identify the natural community. In general, communities with the least amount of vegetation are listed at the top of flow charts, while those with the most vegetation are listed at the bottom.

SUB-SYSTEM: Flow charts are organized on the basis of Sub-systems, which are analogous to structural dominance. Each System has two or more Sub-systems, which may be readily identified on flow charts by their occurrence in shaded boxes. For example, Terrestrial Sub-systems include: Open, Herbaceous, Shrub, and Forest/Woodland. Supplemental information, to help you select the proper Sub-system, is often included in the shaded boxes. For example, information associated with the Herbaceous Sub-system indicates that these communities are dominated by herbaceous vegetation and have less than 25% tree and shrub cover (page 7.)

COMMUNITY GROUP: Continue through the flow chart until you come to a group of related communities (i.e., the Community Group), examples include Deciduous Forest/Woodland, Marshes/Wet Meadows, and Estuarine Intertidal. Two terrestrial Sub-systems (i.e., Herbaceous and Shrub) have no Community Groups associated with them. For these two Sub-systems go directly to the Community Type keys. For ***all other*** Sub-systems you will need to identify the Community Group. From most Community Groups you may proceed directly to the keys to Community Type. However, the Rock Substrate Community Group (Terrestrial System, Open Sub-system) and the Peatlands Community Group (Palustrine System, Non-forested Sub-system) require that you identify the Community Sub-group.

COMMUNITY SUB-GROUP: From either the Rock Substrate Community Group (Terrestrial System, Open Sub-system) or the Peatlands Community Group (Palustrine, Non-forested Sub-

system) you will need to identify the appropriate Community Sub-group. Information on separating Community Sub-groups is provided in the flow charts.

COMMUNITY TYPE: Community Types (i.e., natural communities) are most often identified through the use of keys. However, keys are only provided when there is more than one Community Type associated with a particular Community Group or Community Sub-group.

Use the key to identify the *most likely* Community Type for your site. Once you have determined the most likely natural community, confirm this determination by comparing your site to the description for that community. In many instances supporting information, such as location, understory, and vegetation descriptions, is provided to help you confirm the identity of the community.

COMMUNITY DESCRIPTIONS: Community descriptions are in a standard format that includes the following information: community name; the community's state rank (SRANK— an index of rarity within the Commonwealth, with S1 being the most rare and S5 being the most common); a general description of the community; information on topography and soils; and a “top to bottom” listing of the community's structure and component plant species, from tree canopy down to leaf litter. Information contained in these descriptions has been taken directly from Swain and Kearsley (2001), with minor modifications for formatting. A list containing the common name, scientific name, and plant code for plants listed in community descriptions is included in the back of this guide (beginning on page 128.)

As with Swain and Kearsley (2001), descriptions in this guide are for communities in “exemplary condition”; that is, for ideal communities. Experience identifying natural communities in Southeastern Massachusetts has revealed that natural communities in the real world only occasionally occur in exemplary condition. Because of this, determination of natural community often involves identifying the natural community with the description that *most closely* matches what you observe in the field.

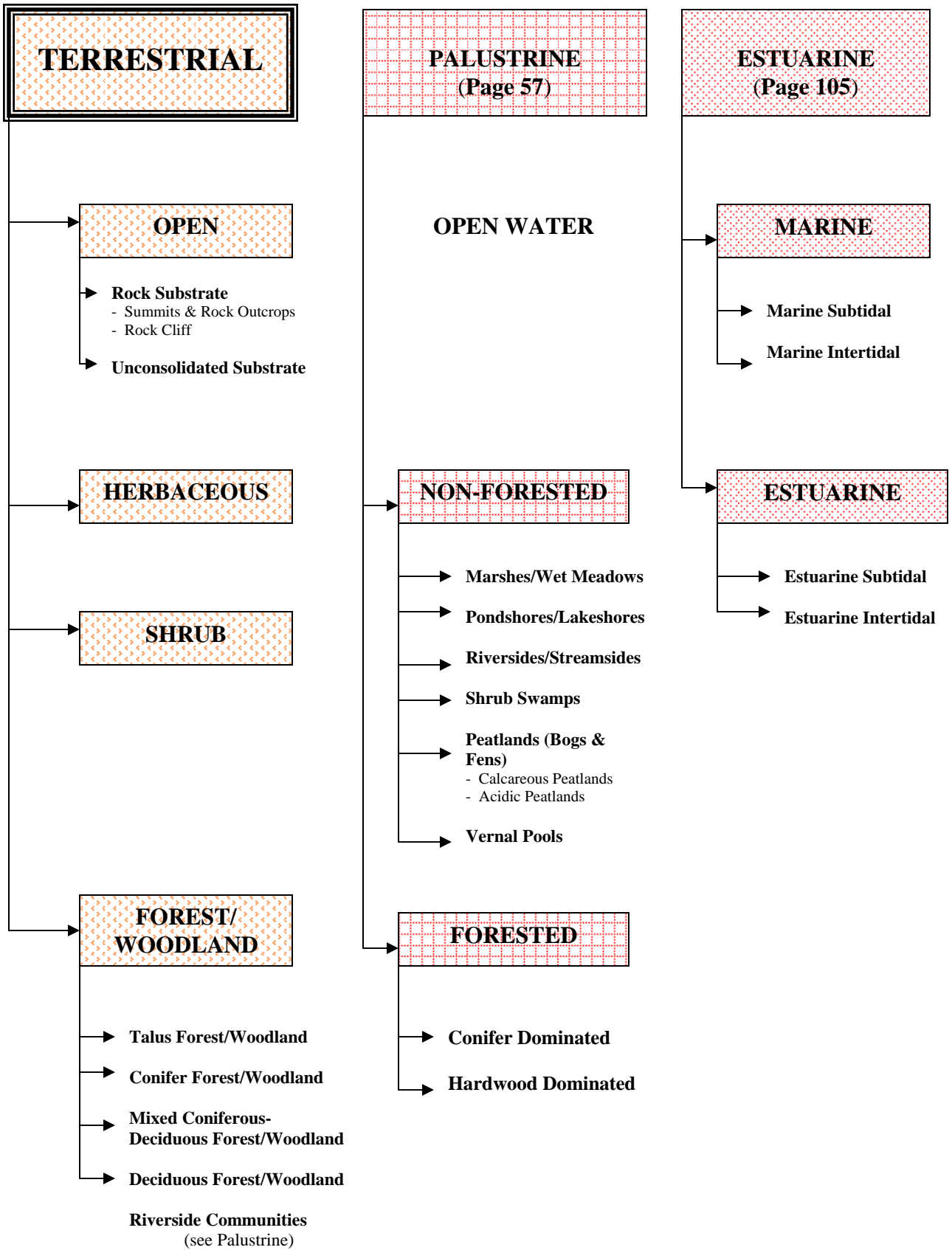
DECISION RULES: Community descriptions may also contain community codes and decision rules. This information is *not* part of the State's official classification system, but is a system developed by MassWildlife for describing the vegetative cover at Wildlife Management Areas. We have included these decision rules, indicated by square brackets [], not to endorse their use (that is up to the individual user), but because they may provide information on the amount of variability you may encounter within a natural community.

A Few Words About State Rank
(after Swain and Kearsley 2001)

The state rank (SRANK) of a community reflects its rarity and threat within Massachusetts. The SRANKs are defined as follows:

- S1 – Typically ≤ 5 occurrences, few remaining acres, or vulnerable to extirpation.
- S2 – Typically 6-20 occurrences, few remaining acres, or vulnerable to extirpation.
- S3 – Typically 21-100 occurrences, or limited acreage.
- S4 – Apparently secure in Mass.
- S5 – Demonstrably secure in Mass.

Be on the lookout for natural communities with ranks of S1 through S3, report their occurrence, and protect them when possible.



OPEN

(SPARSE VEGETATION, <25% TREE, SHRUB, AND HERBACEOUS COVER)

ROCK SUBSTRATE

SUMMITS & ROCK OUTCROPS (Mostly horizontal)

Page 10

Acidic Rocky Summit/Rock Outcrop
Circumneutral Rocky Summit/Rock Outcrop
Riverside Rock Outcrop
Serpentine Outcrop
Calcareous Rocky Summit/Outcrop

ROCK CLIFF (Vertical)

Page 15

Acidic Rock Cliff
Circumneutral Rock Cliff
Maritime Rock Cliff
Calcareous Rock Cliff

UNCONSOLIDATED SUBSTRATE

(Page 19)

Maritime Erosional Cliff
Maritime Beach Strand
Maritime Dune

HERBACEOUS

(DOMINATED BY HERBACEOUS VEGETATION
<25% TREE AND SHRUB COVER)

(Page 21)

Sandplain Grassland
Cultural Grassland
Dry Riverside Bluff

SHRUB

(< 25% TREE CANOPY)

(Page 23)

Sandplain Heathland
Maritime Shrubland
Maritime Pitch Pine on Dunes
Maritime Juniper Woodland/Shrubland
Scrub Oak Shrubland
Pitch Pine – Scrub Oak
Ridgetop Pitch Pine – Scrub Oak

FOREST/WOODLAND

(> 25% TREE CANOPY)

TALUS FOREST/WOODLAND (Boulder strewn slopes; Page 28)

Circumneutral Talus Forest/Woodland
Acidic Talus Forest/Woodland
Calcareous Talus Forest/Woodland

CONIFER FOREST/WOODLAND (Canopy \geq 75% conifers; Page 32)

Successional White Pine Forest
Hemlock Ravine
High Elevation Spruce Forest

MIXED CONIFEROUS-DECIDUOUS FOREST/WOODLAND (Canopy \geq 25% conifers and \geq 25% deciduous; Page 34)

Maritime Oak – Holly Forest/Woodland
Coastal Forest/Woodland
Pitch Pine – Oak Forest
White Pine – Oak Forest
Oak – Hemlock – White Pine Forest
Northern Hardwoods – Hemlock – White Pine
Maritime Juniper Woodland/Shrubland
Spruce – Fir – Northern Hardwood Forest

FOREST/WOODLAND (CONTINUED)

(> 25% TREE CANOPY)

DECIDUOUS FOREST/WOODLAND

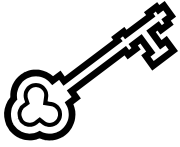
(Canopy \geq 75% deciduous; **Page 43**)

Mixed Oak Forest
Ridgetop Chestnut Oak Forest/Woodland
Black Oak – Scarlet Oak Forest/Woodland
Oak – Hickory Forest
Dry, Rich Acidic Oak Forest
Red Oak-Sugar Maple Transition Forest
Rich, Mesic Forest
Forest Seep
Hickory – Hop-hornbeam Forest/Woodland
Successional Northern Hardwoods Forest
Coastal Forest/Woodland
Yellow Oak Dry Calcareous Forest
Calcareous Forest Seep

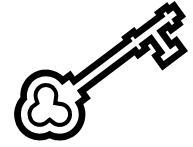
RIVERSIDE COMMUNITIES

(See Palustrine System for Floodplain Forests)

SUMMIT AND ROCK OUTCROP COMMUNITIES (Mostly Horizontal)



Shortcut Key: Check full descriptions following use



1. Community on outcrop located along river, and showing signs of flood scouring.
A. Yes – Riverside Rock Outcrop
B. No – Go to 2
2. Community on outcrop of green (although may also be brown, gray-white, or yellow) rock with a greasy, waxy luster and feel. Rock often fibrous.
A. Yes – Serpentine Rock Outcrop
B. No – Go to 3
3. Community on a ridgetop or mid-slope ledge of limestone, marble, dolomite, or other calcareous rock. Surrounding trees characteristic of rich forest. Ferns common if on outcrop.
A. Yes – Calcareous Rocky Summit/Rock Outcrop
B. No – Go to 4
4. Community on bedrock outcrop of granite, quartzite, schist, or other acidic rock. Shrubs characteristic of poor soils (e.g., scrub oak, black huckleberry, low bush blueberry) are dominant.
A. Yes – Acidic Rocky Summit/Rock Outcrop
B. No – Circumneutral Rocky Summit/Rock Outcrop



These communities can be surprisingly difficult to identify.

Identification to community type may require knowledge of geology. Although serpentine is readily identified, acidic, calcareous, and circumneutral rocks are more difficult to identify.

In general, calcareous rock communities have vegetation characteristic of rich soils, acidic rock communities have shrubs associated with poor soils (e.g., scrub oak, blueberry), and circumneutral rock communities are dominated by grasses.

Descriptions of Summits and Rock Outcrops (mostly horizontal)

Riverside Rock Outcrop

S3

| | |
|---------------------|--|
| Description/Concept | Sparse, mostly herbaceous vegetation on outcrops influenced by river processes. Vegetation is typical of other outcrop communities, but has fewer woody plants. Typically, only a few species of plants are present at a site. |
| Topography | Flood scoured bedrock along rivers. |
| Soils/Substrate | Alluvial soil accumulated in flood scoured bedrock. |
| Canopy | |
| Sub-canopy | |
| Shrub layer | |
| Herb layer | Typical plants include: harebell; Canadian burnet; big bluestem; prostrate dogbane; goldenrods; or smooth (a.k.a. riverside) rose. |
| Leaf litter | |

Serpentine Outcrop

S1

| | |
|---------------------|--|
| Description/Concept | Open, sparse, herbaceous vegetation with little tree or shrub growth. Often <1 acre in size. |
| Topography | Exposed ledges or outcrops. |
| Soils/Substrate | Exposed ledges or rock outcrops. Serpentine or other rocks high in magnesium. |
| Canopy | Often from surrounding communities. White pine, eastern hemlock, red maple, red oak, and birches may be present from edges. |
| Sub-canopy | |
| Shrub layer | Witch hazel (sparse). |
| Herb layer | Large-leaved sandwort is an absolute indicator, but isn't always present. Bracken, maidenhair spleenwort, and grasses. Calcium-loving species (e.g., columbine, harebell, rock spikemoss) some times present. |
| Leaf litter | |

Acidic Rocky Summit/Rock Outcrop

S4

| | |
|---------------------|--|
| Description/Concept | Widespread, open community of low shrubs, scattered grasses, mosses, lichens, and occasional trees on rocky summits or exposed outcrops. Vegetation discontinuous, concentrated around edges or concentrated in pockets of soil. May have extensive lichen and moss. |
| Topography | Summit (i.e., ridge tops) or outcrops. Typically found on steep slopes with aspect of SE-SW. |
| Soils/Substrate | Exposed acidic bedrock or outcrops. Little or no soil. |
| Canopy | Largely absent. Common adjacent trees include: pitch, white, and red pine; and northern red oak. |
| Sub-canopy | |
| Shrub layer | Low. Dominant shrubs include: scrub oak; huckleberry; lowbush blueberries; black chokecherry; and dwarf serviceberry. Dwarf chestnut oak may be present, but is uncommon. |
| Herb layer | Scattered clumps. Species include: little bluestem; poverty grass; common hairgrass; Pennsylvania sedge; and cow-wheat. |
| Leaf litter | |

Calcareous Summit/Rock Outcrop**S2**

| | |
|---------------------|--|
| Description/Concept | Open community of shrubs and herbaceous plants on calcareous ridge tops or mid-slope ledges. <i>RIDGE TOP</i> - support relatively sparse herbaceous vegetation. <i>OUTCROP</i> - tend to be moister and lightly shaded. |
| Topography | Summit (i.e., ridge tops) or outcrops/ledges. |
| Soils/Substrate | Exposed calcareous bedrock or outcrops/ledges. |
| Canopy | <i>RIDGE TOP</i> - trees uproot and pull away from ridge, keeping community open. <i>OUTCROP</i> – adjacent trees characteristic of Rich Mesic Forest, including sugar maple, white ash, and hop-hornbeam. |
| Sub-canopy | |
| Shrub layer | <i>RIDGE TOP</i> – round-leaved dogwood, round-leaved shadbush as well as less common northern prickly rose, hairy honeysuckle, and downy arrow-wood. <i>OUTCROP</i> – no shrub layer described. |
| Herb layer | <i>RIDGE TOP</i> – ivory sedge, purple clematis, long-leaved bluet, balsam groundsel, and lyre-leaved rock-cress. <i>OUTCROP</i> – species characteristic of Rich Mesic Forests, with high proportion of ferns including bulblet, fragile, walking, and blunt lobed wood-fern; and ebony and maidenhair spleenwort. Other plants include ivory, Pennsylvania, and peduncled sedge; harebell, early saxifrage, lyre-leaved rock cress, smooth rock cress, columbine, and balsam groundsel. |
| Leaf litter | |

Circumneutral Rocky Summit/Rock Outcrop**S2/S3**

| | |
|---------------------|---|
| Description/Concept | Open community on rocky summits, ridges, and outcrops that is dominated by grasses, sedges, and herbaceous plants. May have extensive lichen and moss. Often found in oak forest matrix near Hickory-Hop-hornbeam Community. May grade into Circumneutral Rock Cliff Community. |
| Topography | Exposed ledges or outcrops. |
| Soils/Substrate | Dry, with soil confined to cracks in rocks. Found on circumneutral rock substrates such as traprock (e.g., basalt) or conglomerate. |
| Canopy | Occasional isolated trees of eastern red cedar, shagbark and sweet pignut hickory, and white ash. |
| Sub-canopy | |
| Shrub layer | Shrubs usually restricted to edge openings. Carolina rose, bearberry, and hackberry may be present and found throughout. |
| Herb layer | Ranges from patchy to continuous. Dominant species include Pennsylvania and parasol sedge, poverty grass, and little bluestem. Other typical species include: rusty cliff-fern; rock spikemoss; early saxifrage; arrow-leaf violet; dry land bittercress; skunk meadow-rue; strawberry; dwarf dandelion, pale corydalis; sleepy catch fly; Venus' looking glass; blue curls; goldenrods; and grasses. |
| Leaf litter | |

Plants Associated with Summit and Rock Outcrop Communities

| | Riverside Rock Outcrop | Serpentine Rock Outcrop | Acidic Summit/Rock Outcrop | Calcareous Summit/Rock Outcrop | Circumneutral Summit/Rock Outcrop |
|-------------------------|------------------------------|-------------------------------|----------------------------------|--------------------------------------|---|
| Arrow-wood, Downy | | | | Occurs | |
| Ash, White | | | | Occurs | Occurs |
| Bearberry | | | | | Occurs |
| Birch | | Occurs | | | |
| Bittercress, Dry land | | | | | Occurs |
| Blueberry, Lowbush | | | Dominant | | |
| Bluestem, Big | Typical | | | | |
| Bluestem, Little | | | Occurs | | Occurs |
| Bluet, Long-leaved | | | | Occurs | |
| Bracken (fern) | | Occurs | | | |
| Burnet, Canadian | Typical | | | | |
| Cedar, Eastern Red | | | | | Occurs |
| Chokeberry, Black | | | Dominant | | |
| Clematis, Purple | | | | Occurs | |
| Cliff-fern, Rusty | | | | | Occurs |
| Columbine | | Occurs | | Occurs | |
| Corydalis, Pale | | | | | Occurs |
| Cow-Wheat | | | Occurs | | |
| Curls, Blue | | | | | Occurs |
| Dandelion, Dwarf | | | | | Occurs |
| Dogbane, Prostrate | Typical | | | | |
| Dogwood, Round-leaved | | | | Occurs | |
| Fern, Bulblet | | | | Occurs | |
| Fern, Fragile | | | | Occurs | |
| Fern, Walking | | | | Occurs | |
| Goldenrod | Typical | | | | Occurs |
| Grass | | Occurs | | | Occurs |
| Grass, Poverty | | | Occurs | | Occurs |
| Groundsel, Balsam | | | | Occurs | |
| Hackberry | | | | | Occurs |
| Hairgrass, Common | | | Occurs | | |
| Harebell | Typical | Occurs | | Occurs | |
| Hemlock, Eastern | | Occurs | | | |
| Hickory, Shagbark | | | | | Occurs |
| Hickory, Sweet Pignut | | | | | Occurs |
| Honeysuckle, Hairy | | | | Occurs | |
| Hop-hornbeam | | | | Occurs | |
| Huckleberry, Black | | | Dominant | | |
| Maple, Red | | Occurs | | | |
| Maple, Sugar | | | | Occurs | |
| Meadow-rue, Skunk | | | | | Occurs |
| Oak, Dwarf Chestnut | | | Uncommon | | |
| Oak, Northern Red | | Occurs | Common | | |
| Oak, Scrub | | | Dominant | | |
| Pine, Pitch | | | Common | | |
| Pine, Red | | | Common | | |
| Pine, White | | Occurs | Common | | |
| Rock Cress, Lyre-leaved | | | | Occurs | |
| Rock Cress, Smooth | | | | Occurs | |
| Rose, Carolina | | | | | Occurs |
| Rose, Northern Prickly | | | | Occurs | |
| Rose, Smooth | Typical | | | | |

Plants Associated with Summit and Rock Outcrop Communities (continued)

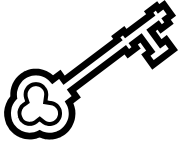
| | Riverside Rock Outcrop | Serpentine Rock Outcrop | Acidic Summit/Rock Outcrop | Calcareous Summit/Rock Outcrop | Circumneutral Summit/Rock Outcrop |
|------------------------|------------------------|-------------------------|----------------------------|--------------------------------|-----------------------------------|
| Sandwort, Large-leaved | | Indicator | | | |
| Saxifrage, Early | | | | Occurs | Occurs |
| Sedge, Ivory | | | | Occurs | |
| Sedge, Parasol | | | | | Occurs |
| Sedge, Peduncled | | | | Occurs | |
| Sedge, Pennsylvania | | | Occurs | Occurs | Occurs |
| Serviceberry, Dwarf | | | Occurs | | |
| Shadbush, Roundleaf | | | | Occurs | |
| Sleepy Catchfly | | | | | Occurs |
| Spikemoss, Rock | | Occurs | | | Occurs |
| Spleenwort, Ebony | | | | Occurs | |
| Spleenwort, Maidenhair | | Occurs | | Occurs | |
| Strawberry | | | | | Occurs |
| Venus' Looking Glass | | | | | Occurs |
| Violet, Arrow-leaf | | | | | Occurs |
| Witch hazel | | Occurs | | | |
| Wood-fern, Blunt-lobed | | | | Occurs | |

NOTE: This is not an exhaustive list of plant species that occur in these communities. Rather, it is a list of species associated with these communities as identified in Swain and Kearsley (2001.)

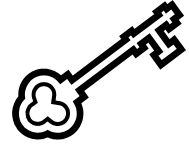
Known Distribution of Summit and Rock Outcrop Communities

| Community Type | Berkshires | Connecticut Valley | Worcester Plateau | Eastern Mass. | Cape & Islands |
|---|------------|--------------------|-------------------|---------------|----------------|
| Riverside Rock Outcrop | X | X | | Probable | |
| Serpentine Outcrop | X | | | X | |
| Acidic Rocky Summit/Rock Outcrop | X | X | X | X | |
| Calcareous Rocky Summit/Rock Outcrop | X | X | | | |
| Circumneutral Rocky Summit/Rock Outcrop | | X | X | X | |

ROCK CLIFF COMMUNITIES (VERTICAL)

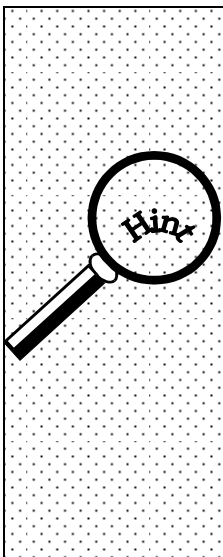


Shortcut Key: Check full descriptions following use of key



There is vegetative overlap between the Acidic Rock Cliff and the Circumneutral Rock Cliff communities. As a result, plants alone may not be enough to identify the community type.

1. Community on rock cliff within the salt spray zone of ocean.
 - A. Yes – Maritime Rock Cliff Community
 - B. No – Go to 2
2. Community on rock cliff of limestone, dolomite, or other calcareous bedrock. Purple cliff-brake, bulblet fern, walking fern, blunt-lobed cliff-fern, and/or maidenhair spleenwort occur.
 - A. Yes – Calcareous Rock Cliff Community
 - B. No – Go to 3
3. Community on cliff of granite, quartzite, schist, or other acidic rock.
 - A. Yes – Acidic Rock Cliff
 - B. No – Circumneutral Rock Cliff



As with summits and rock outcrops, these communities can be surprisingly difficult to identify.

The Maritime Rock Cliff Community may be identified on the basis of location, and the Calcareous Rock Cliff Community on the basis of its distinct vegetation. However, the Acidic Rock Cliff Community's vegetation is not distinctive and may overlap that of the Circumneutral Rock Cliff Community. In general, the latter community will have plants associated with rich(er) soils, while the Acidic Rock Cliff Community will have plants associated with nutrient-poor soils.

Identify the community to the *lowest level possible*, but recognize that you may not be able to conclusively separate acidic and circumneutral communities solely on the basis of vegetation.

Descriptions of Rock Cliff Communities

Maritime Rock Cliff

S2

| | |
|---------------------|---|
| Description/Concept | Sparsely vegetated rock areas with plants in cracks and ledges. Species from top of headland occur in less exposed ledges. Above the tidal zone but within salt spray zone . |
| Topography | Ocean side of rocky headlands. |
| Soils/Substrate | A vertical substrate of rock. |
| Canopy | |
| Sub-canopy | |
| Shrub layer | |
| Herb layer | Low, scattered wind and salt hardy plants including: knotted pearlwort, saltworts, common rush, seaside plantain, poison ivy, and mosses. |
| Leaf litter | |

Calcareous Rock Cliff

S3

| | |
|---------------------|--|
| Description/Concept | Extremely sparse vegetation in cracks and small ledges. More diverse than Acidic Rock Cliff community. Lichen and mosses may be present. |
| Topography | A vertical, or near vertical, substrate of rock. |
| Soils/Substrate | Limestone, dolomite, or other calcareous bedrock. |
| Canopy | Surrounding trees associated with northern hardwood forest or Rich Mesic Forest, such as sugar maple, white ash, basswood, butternut, and black and yellow birches. |
| Sub-canopy | |
| Shrub layer | |
| Herb layer | Distinct and specific to habitat. Purple cliff-brake, bulblet fern, walking fern, blunt-lobed cliff-fern, maidenhair spleenwort, and columbine are characteristic. Other plants include bearberry, harebell, early saxifrage, rock-pellitory, small enchanter's nightshade, and rock-cresses. |
| Leaf litter | |

Acidic Rock Cliff

S4

| | |
|---------------------|--|
| Description/Concept | Scattered vascular plants on small ledges and in crevices. Lichens occasionally dense. Vascular vegetation sparse and <i>plant association not distinctive</i> . |
| Topography | A vertical substrate of rock, with little soil and few nutrients. |
| Soils/Substrate | Acidic rock. |
| Canopy | May be shaded by trees of surrounding forest. Highly variable; including oak forests, northern hardwoods, and hemlocks. |
| Sub-canopy | |
| Shrub layer | |
| Herb layer | Common polypody and rusty cliff fern are often present in crevices. Harebell, bristly sarsaparilla, marginal wood fern, fringed bindweed, stout goldenrod, and Virginia creeper are common. Purple-flowering raspberry occurs in northern and western part of state. |
| Leaf litter | |

Circumneutral Rock Cliff**S3**

| | |
|---------------------|---|
| Description/Concept | Extremely sparse, scattered vascular plants on small ledges and in crevices. Lichens occasionally dense. More diverse than Acidic Rock Cliff community. |
| Topography | A vertical substrate of rock. |
| Soils/Substrate | Sandstone, traprock, conglomerate, or other non-acidic, non-calcareous rock. |
| Canopy | May be shaded by trees of surrounding forest. |
| Sub-canopy | |
| Shrub layer | Chestnut and scrub oak, red cedar, pasture rose, and prickly ash may be in area. |
| Herb layer | Species of dry open areas, including: pale corydalis, bearberry, plantain-leaved pussytoes, columbine, marginal wood-fern, little bluestem, ebony spleenwort, rusty cliff-fern, and mosses. |
| Leaf litter | |

Known Distribution of Rock Cliff Communities

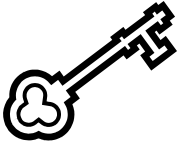
| Community Type | Berkshires | Connecticut Valley | Worcester Plateau | Eastern Mass. | Cape & Islands |
|--------------------------|-------------------|---------------------------|--------------------------|----------------------|---------------------------|
| Acidic Rock Cliff | X | X | X | X | |
| Circumneutral Rock Cliff | | X | X | X | |
| Maritime Rock Cliff | | | | X | X |
| Calcareous Rock Cliff | X | X | | | |

Plants Associated with Rock Cliff Communities

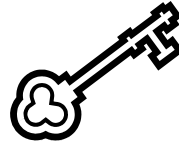
| | Maritime Rock Cliff | Acidic Rock Cliff | Calcareous Rock Cliff | Circumneutral Rock Cliff |
|-------------------------------|------------------------|----------------------|--------------------------|-----------------------------|
| Ash, White | | | Occurs | |
| Basswood | | | Occurs | |
| Bearberry | | | Occurs | Occurs |
| Bindweed, Fringed | | Occurs | | |
| Birch, Black | | | Occurs | |
| Birch, Yellow | | | Occurs | |
| Bluestem, Little | | | | Occurs |
| Butternut | | | Occurs | |
| Cedar, Eastern Red | | | | Occurs |
| Cliff-brake, Purple | | | Characteristic | |
| Cliff-fern, Blunt-lobed | | | Characteristic | |
| Cliff-fern, Rusty | | Occurs | | Occurs |
| Columbine | | | Characteristic | Occurs |
| Corydalis, Pale | | | | Occurs |
| Fern, Bulblet | | | Characteristic | |
| Fern, Walking | | | Characteristic | |
| Goldenrod, Stout | | Occurs | | |
| Harebell | | Occurs | Occurs | |
| Hemlock, Eastern | | Occurs | | |
| Lichen | | Occurs | Occurs | Occurs |
| Maple, Sugar | | | Occurs | |
| Moss | Occurs | | Occurs | Occurs |
| Nightshade, Small Enchanter's | | | Occurs | |
| Oak, Chestnut | | | | Occurs |
| Oak, Scrub | | | | Occurs |
| Pearlwort, Knotted | Occurs | | | |
| Plantain, Seaside | Occurs | | | |
| Poison Ivy | Occurs | | | |
| Polypody, Common | | Occurs | | |
| Prickly Ash | | | | Occurs |
| Pussytoes, Plantain-leaved | | | | Occurs |
| Raspberry, Purple-flowering | | Occurs | | |
| Rock-Cress, Hairy | | | Occurs | |
| Rock Cress, Lyre-leaved | | | Occurs | |
| Rock Cress, Smooth | | | Occurs | |
| Rock-pellitory | | | Occurs | |
| Rose, Pasture | | | | Occurs |
| Rush, Common | Occurs | | | |
| Saltwort | Occurs | | | |
| Sarsaparilla, Bristly | | Occurs | | |
| Saxifrage, Early | | | Occurs | |
| Spleenwort, Ebony | | | | Occurs |
| Spleenwort, Maidenhair | | | Characteristic | |
| Virginia Creeper | | Occurs | | |
| Wood-fern, Marginal | | Occurs | | Occurs |

NOTE: This is not an exhaustive list of plant species that occur in these communities. Rather, it is a list of species associated with these communities as identified in Swain and Kearsley (2001.)

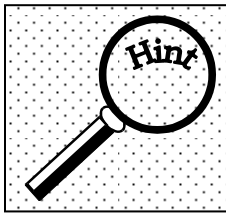
UNCONSOLIDATED SUBSTRATE COMMUNITIES



Shortcut Key: Check full descriptions following use of keys



1. Coastal Community on a vertical or near vertical cliff being actively eroded by the sea.
A. Yes – Maritime Erosional Cliff
B. No – Go to 2
2. Community located between fore dunes and wrack line.
A. Yes – Maritime Beach Strand
B. No – Go to 3
3. Community on sand dunes with patches of herbaceous plants interspersed with areas of bare sand and shrubs.
A. Yes – Maritime Dune



Unconsolidated Substrate Communities are easily differentiated.

A community's location, relative to the water's edge, and physical structure permit positive identification.

Descriptions of Unconsolidated Substrate Communities

Maritime Erosional Cliff

S2

| | |
|---------------------|--|
| Description/Concept | Extremely sparse vegetation on cliffs being actively eroded by the sea. In salt spray zone. Vegetation typical of surrounding areas. |
| Topography | Seaward unconsolidated cliff faces. |
| Soils/Substrate | Clay or sand. |
| Canopy | |
| Sub-canopy | |
| Shrub layer | Bayberry, beach-plum, black cherry, sweet fern, huckleberry. |
| Herb layer | Poison ivy, Virginia creeper, roses, bearberry, catbrier. |
| Leaf litter | |

Maritime Beach Strand

S3

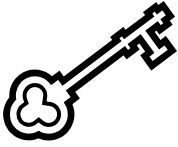
| | |
|---------------------|---|
| Description/Concept | Sparsely vegetated, long, narrow community between wrack line and fore dunes. Subject to overwash. |
| Topography | Seaward of dunes but above high tide. |
| Soils/Substrate | Sand. |
| Canopy | |
| Sub-canopy | |
| Shrub layer | |
| Herb layer | Sea-rocket, beach grass, beach pea, sea beach orache, seabeach sandwort, seaside flatsedge, seabeach saltwort, seaside goldenrod. |
| Leaf litter | |

Maritime Dune

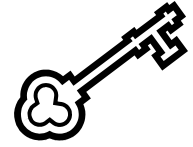
S2

| | |
|---------------------|--|
| Description/Concept | Classic community of sand dunes. Patches of herbaceous plants interspersed with areas of bare sand and shrubs. Within salt spray zone. |
| Topography | Windswept dunes. |
| Soils/Substrate | Sand. |
| Canopy | Scattered pitch pine (possible.) |
| Sub-canopy | |
| Shrub layer | Bearberry, bayberry, lowbush blueberries, sweet fern, beach-plum. |
| Herb layer | Beach grass, seaside goldenrod, beach pea, heathers, poison ivy. Salt hay, hair grass, little bluestem, and poverty grass are common. Pinweed, nutrush, and sand jointweed grow with heathers. |
| Leaf litter | |

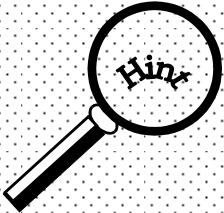
HERBACEOUS COMMUNITIES



Shortcut Key: Check full descriptions following use of key



1. Community on cliff face next to river or in floodplain.
A. Yes – Dry Riverside Bluff
B. No – Go to 2
2. Community dominated by grasses, but with forbs and shrubs, on flat outwash plain with droughty low nutrient soils. Indicator species, such as goat's rue, yellow wild indigo, bird's foot violet, and butterfly weed are typically present.
A. Yes – Sandplain Grassland
B. No – Go to 3
3. A human created and maintained grass-dominated community (e.g., pastures, hay fields, capped landfills, airport grasslands.)
A. Yes – Cultural Grassland ^a

| | |
|---|--|
|  | <p>Herbaceous communities may generally be identified correctly. However, in some instances human created and/or maintained grasslands will contain plants that are indicators of a Sandplain Grassland.</p> <p>When an herbaceous community is dominated by a variety of native species, and contains indicators of Sandplain Grasslands, it is most appropriate to describe that community as a Sandplain Grassland.</p> |
|---|--|

- b. The Cultural Grassland is the exception to the rule for classifying Massachusetts' natural communities. This is the only cultural community recognized by the classification system.

Descriptions of Herbaceous Communities

Sandplain Grassland

S1

| | |
|---------------------|--|
| Description/Concept | An open community dominated by grasses although forbs and shrubs are important. Most occur near the ocean within the influence of salt spray. Often occurs as openings in pitch pine/scrub oak communities. Great species overlap with sandplain heathlands. |
| Topography | Flat, outwash plain. |
| Soils/Substrate | Droughty, low nutrient soils. |
| Canopy | |
| Sub-canopy | |
| Shrub layer | Shrub clones often form patches. Bearberry, scrub oak, bayberry, lowbush blueberry, and black huckleberry. |
| Herb layer | Goat's rue, yellow wild indigo, butterfly weed, and bird's foot violet are good indicators. Dominated by little bluestem, Pennsylvania sedge, and poverty grass. |
| Leaf litter | |

[Decision Rules: GR category = >90% grass, forbs, and sedges, and <10% shrub/tree cover.]

Cultural Grassland

N/A

| | |
|---------------------|---|
| Description/Concept | Human created and maintained community. Dominated by grasses. Includes pastures, hayfields, abandoned fields, airports, cemeteries, recreation fields, and utility rights of way. |
| Topography | |
| Soils/Substrate | Sand, or other droughty low nutrient soils. |
| Canopy | |
| Sub-canopy | |
| Shrub layer | |
| Herb layer | Often little bluestem, Pennsylvania sedge, poverty grass, and non-native species. Some have herbaceous species, such as goldenrods and milkweeds. |
| Leaf litter | |

[Decision Rules: GR category = >90% grass, forbs, and sedges, and <10% shrub/tree cover.

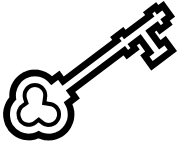
MassWildlife further interprets Cultural Grasslands to include pastures (PA) and hayfields (HA.)]

Dry Riverside Bluff

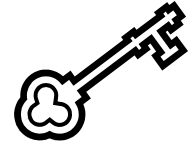
S2

| | |
|---------------------|---|
| Description/Concept | Erosional sandy cliff face next to rivers or floodplains; often 20-40 feet high. Species present associated with dry habitats, in open conditions. |
| Topography | Cliff face. |
| Soils/Substrate | Gravel. |
| Canopy | |
| Sub-canopy | |
| Shrub layer | Individuals or thickets of: scrub oak, American hazelnut, gray birch, and quaking aspen. Lowbush blueberry and sweet fern may be present between patches of shrubs. |
| Herb layer | Little bluestem, goat's rue, stiff aster, woodland sunflower, and lupine may be present between patches of shrubs. |
| Leaf litter | |

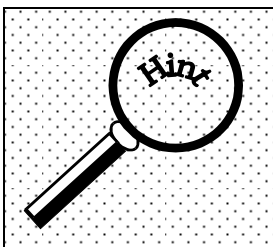
SHRUB COMMUNITIES



Shortcut Key: Check full descriptions following use of key



1. Pitch pine common or dominant.
A. Yes – Go to 2
B. No – Go to 6
2. Scrub oak common or dominant.
A. Yes – Go to 3
B. No – Go to 4
3. Pitch pine-scrub oak community located on ridge, steep slope, or rocky outcrop.
A. Yes – Ridgetop Pitch Pine – Scrub Oak
B. No – Pitch Pine-Scrub Oak
4. Scattered pitch pine on active sand dune.
A. Yes – Maritime Pitch Pine on Dunes
B. No – Go to 5
5. Area within direct influence of salt spray, red cedar dominates.
A. Yes – Maritime Juniper Woodland/
Shrubland
6. Scrub oak common or dominant.
A. Yes – Go to 7
B. No – Maritime Shrubland
7. Community uniformly dominated by scrub oak.
A. Yes – Scrub Oak Shrubland
B. No – Sandplain Heathland



There is considerable overlap among shrub communities, and some may occur as patches within other shrub communities.

Use the supporting information to help identify the correct community type, and read the descriptions carefully.

Locations of Shrub Communities

| Location | Community Type |
|--|-------------------------------------|
| Within Daily Salt Spray Influence | Maritime Juniper Woodland/Shrubland |
| | |
| Coastal, But Beyond Daily Salt Spray Influence | Sandplain Heathland (possible) |
| | Maritime Shrubland |
| | Maritime Pitch Pine on Dunes |
| | |
| Beyond Reach of Salt Spray | Sandplain Heathland (possible) |
| | Scrub Oak Shrubland |
| | Pitch Pine–Scrub Oak |
| | |
| Ridgetops, Steep Slopes, or Rocky Outcrops | Ridgetop Pitch Pine–Scrub Oak |

Descriptions of Shrub Communities

Sandplain Heathland

S1

| | |
|---------------------|--|
| Description/Concept | An open, shrub dominated , primarily coastal community. Often have sparse clumps of plants with bare soil or lichens between vascular plants. Grade into Sandplain Grasslands; differs in proportion of herbaceous vs. woody vegetation and structure of community. Less species rich than grasslands, and appear taller. Often occur in openings of Maritime Shrubland, Pitch Pine-Scrub Oak, and Scrub Oak communities. |
| Topography | |
| Soils/Substrate | Acidic, nutrient poor, droughty soils. |
| Canopy | |
| Sub-canopy | |
| Shrub layer | Scrub oak , black huckleberry, bearberry, and/or lowbush blueberries may dominate. Other characteristic plants include bayberry, golden heather, chokeberry, dwarf chinquapin oak, and sweet fern. Tall shrubs include beaked hazelnut, beach-plum, and dewberry. |
| Herb layer | Hairgrass, Pennsylvania sedge, little bluestem, and stiff aster are characteristic. |
| Leaf litter | |

Maritime Shrubland**S3**

| | |
|---------------------|---|
| Description/Concept | Patches of dense shrubs with scattered, more open areas of low growth or bare ground. Often dense patches of shrubs, with different species dominating in different areas. Coastal, but out of daily range of salt spray . |
| Topography | Rocky headlands or behind dunes in protected areas of barrier beaches. |
| Soils/Substrate | Rocky headlands, sand dunes. |
| Canopy | |
| Sub-canopy | |
| Shrub layer | Huckleberry, bayberry, and eastern red cedar areas often distinctive. Black cherry, beach-plum, chokeberry, lowbush blueberry, and bearberry may be abundant. Catbrier and poison ivy often cover other plants or grow on dense patches of their own. |
| Herb layer | |
| Leaf litter | |

Maritime Pitch Pine on Dunes**S1**

| | |
|---------------------|---|
| Description/Concept | Scattered pitch pine on active sand dunes, with trunks at least partially buried. Open canopy with bare ground, scattered shrubs, herbaceous plants, and patches of lichens. Coastal, but out of daily range of salt spray . |
| Topography | Occurs on moderately stabilized back dunes. |
| Soils/Substrate | |
| Canopy | Short, scattered individual pitch pine. |
| Sub-canopy | |
| Shrub layer | Scattered. Beach heather and bearberry common. |
| Herb layer | Patches of lichen common. |
| Leaf litter | |

[Decision Rules: PP dn = >75% pitch pine on dunes.]

Maritime Juniper Woodland/Shrubland**S1**

| | |
|---------------------|---|
| Description/Concept | Predominantly evergreen woodland/shrubland. Within direct influence of ocean salt and spray. Shorter than interior forests. May be protected from direct spray by crests of dunes. |
| Topography | Tend to occur in interdunal areas, backs of dunes, exposed bluffs, salt marsh borders, and, to a lesser extent, on rocky headlands. |
| Soils/Substrate | Sand, rocky headlands. |
| Canopy | Trees short (<5 m) and sculpted by wind and salt spray. Red cedar dominates but occurs in variable, usually low densities. In association with pitch pine, oaks, American holly, black cherry, and red maple. |
| Sub-canopy | |
| Shrub layer | Bayberry, winged sumac, and beach heather often in association with canopy species listed above. |
| Herb layer | Highly variable. Little bluestem, American beach grass, and sedges. |
| Leaf litter | |

[Decision Rules for Ju ms community: >50% of 1, 2, or 3 species: red cedar, pitch pine, central hardwoods, and 25-75% red cedar.]

NOTE: This community is listed in both the Shrublands and the Forest/Woodlands sections of this guide.

Scrub Oak Shrubland

S1

| | |
|---------------------|--|
| Description/Concept | Shrubland dominated by scrub oak. Essentially no pitch pine. Occurs within Pitch Pine-Scrub Oak areas (e.g., frost pockets or ridge tops.) |
| Topography | |
| Soils/Substrate | |
| Canopy | |
| Sub-canopy | |
| Shrub layer | Scrub oak and dwarf chinquapin oak dominated shrublands. Variety of other heathland plants occur (huckleberry, lowbush blueberry.) |
| Herb layer | Significant component of graminoid cover (e.g., Pennsylvania sedge, little bluestem) interspersed with lichens. |
| Leaf litter | |

[Decision Rules: SBOK community = >50% scrub oak.]

Pitch Pine – Scrub Oak

S2

| | |
|---------------------|--|
| Description/Concept | Shrub dominated community with scattered to dense trees and scattered openings. |
| Topography | |
| Soils/Substrate | Droughty, low nutrient soils; usually deep, coarse, well drained sands of glacial origin. |
| Canopy | Pitch pine forms open canopy over shrub oaks (usually scrub oak.) Inland variants may have gray birch, trembling aspen, black cherry, or fire cherry. |
| Sub-canopy | |
| Shrub layer | Scrub oak, may be impenetrable (3-4 m) or open and shorter. Huckleberry occurs between the oaks. Scattered openings support heathland vegetation (e.g., lowbush blueberry, bearberry, beach heather, mayflower.) |
| Herb layer | Scattered openings support grassland vegetation (little bluestem, sedges, cow-wheat.) |
| Leaf litter | |

[Decision rules permit up to 67% canopy for this community. PpOK sb Category = > 50% pitch pine and oaks, with >25% and <75% pitch pine, and >25% and <75% oaks.]

Ridgetop Pitch Pine – Scrub Oak

S2

| | |
|---------------------|--|
| Description/Concept | Pitch pine – scrub oak community occurring on acidic bedrock on a ridgetop. Open to closed canopy of pitch pine. Extremely xeric conditions. |
| Topography | Ridgetops, steep upper mountain slopes, and exposed rock outcrops. Aspects may range from N to S; most have S to SW aspect. |
| Soils/Substrate | Acidic bedrock. Soil accumulation is slow, and soil depths are shallow. |
| Canopy | Characteristically contains dwarf pitch pines. Scattered taller trees include red, black, scarlet, and rock chestnut-oak. Hickories occasionally present. White pine may dominate in areas not exposed to fire. |
| Sub-canopy | Hickories occasionally present. |
| Shrub layer | Patchy and often interspersed with large areas of exposed bedrock. Common shrubs include blueberry, scrub oak, and huckleberry. |
| Herb layer | Sparse. May include Canada mayflower, bastard toad-flax, cow-wheat, tall corydalis, and goldenrod. |
| Leaf litter | May consist of a thin layer of duff and decomposed leaves over bedrock. |

[Decision rules permit up to 67% canopy for this community. PpOK sb community = > 50% pitch pine and scrub oak, with >25% and <75% pitch pine, and >25% and <75% scrub oak.]

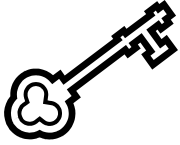
Plants Associated with Shrub Communities

| | Sandplain Heathland | Maritime Shrubland | Maritime Pitch Pine on Dunes | Maritime Juniper | Scrub Oak Shrubland | Pitch Pine - Scrub Oak | Ridgetop Pitch Pine – Scrub Oak |
|-----------------------|---------------------|--------------------|------------------------------|------------------|---------------------|------------------------|---------------------------------|
| Aster, Stiff | Char. | | | | | | |
| Bayberry | Char. | Dominant | | Occurs | | | |
| Beachgrass, American | | | | Occurs | | | |
| Bearberry | Dominant | Occurs | Char. | | | Occurs | |
| Birch, Gray | | | | | | | Occurs |
| Blueberry, Lowbush | Dominant | Occurs | | | Char. | Occurs | Occurs |
| Bluestem, Little | Char. | | | Occurs | Char. | Occurs | |
| Catbrier | | Occurs | | | | | |
| Cedar, Eastern Red | | Dominant | | Dominant | | | |
| Cherry, Black | | Occurs | | Occurs | | | |
| Chokeberry, Black | Char. | | | | | | |
| Corydalis, Tall | | | | | | | Occurs |
| Cow-wheat | | | | | | Occurs | Occurs |
| Dewberry | Occurs | | | | | | |
| Goldenrod | | | | | | | Occurs |
| Hairgrass, Common | Char. | | | | | | |
| Hazelnut, Beaked | Occurs | | | | | | |
| Heather, Beach | | | Char. | Occurs | | Occurs | |
| Heather, Golden | Characteristic | | | | | | |
| Hickory | | | | | | | Occurs |
| Holly, American | | | | Occurs | | | |
| Huckleberry, Black | Dominant | Dominant | | | Char. | Occurs | Occurs |
| Lichen | Char. | | Char. | | Char. | Occurs | |
| Maple, Red | | | | Occurs | | | |
| Mayflower | | | | | | Occurs | |
| Mayflower, Canada | | | | | | | Occurs |
| Oak | | | | Occurs | | | |
| Oak, Black | | | | | | | Occurs |
| Oak, Dwarf Chinquapin | Char. | | | | Dominant | Occurs | |
| Oak, Northern Red | | | | | | | Occurs |
| Oak, Rock Chestnut | | | | | | | Occurs |
| Oak, Scarlet | | | | | | | Occurs |
| Oak, Scrub | Dominant | | | | Dominant | Dominant | Char. |
| Pine, Pitch | | | Dominant | Occurs | | Dominant | Char. |
| Pine, Red | | | | | | | |
| Pine, White | | | | | | | Occurs |
| Plum, Beach | Occurs | Occurs | | | | | |
| Poison Ivy | | Occurs | | | | | |
| Sedge | | | | | | Occurs | |
| Sedge, Pennsylvania | Char. | | | | Char. | | |
| Sumac, Winged | | | | Occurs | | | |
| Sweet Fern | Char. | | | | | | |
| Toadflax, Bastard | | | | | | | Occurs |

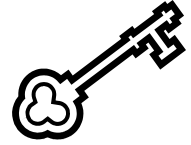
Char. = Characteristic

NOTE: This is not an exhaustive list of plant species that occur in these communities. Rather, it is a list of species associated with these communities as identified in Swain and Kearsley (2001.)

TALUS FOREST/WOODLAND COMMUNITIES (BOULDER STREWN SLOPES)

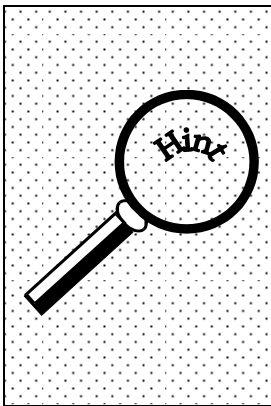


Shortcut Key: Check full descriptions following use



These communities represent a **continuum** of vegetation, from plants associated with nutrient-poor soils to plants associated with nutrient-rich soils. Because of this, **there is considerable vegetative overlap**. As a result, plants alone **may not** be enough to identify the community type.

1. Plants typical of nutrient poor soils, such as gray birch, bracken, currants, eastern hemlock, white pine, Pennsylvania sedge, and silverrod.
 - A. Yes – Acidic Talus Forest/Woodland
 - B. No – Go to 2
2. Plants typical of nutrient rich soils, such as downy arrow-wood, Jack-in-the-pulpit, white avens, bottle-brush grass, broad-leaved woodland-sedge, and walking fern. Sugar maple is usually dominant in canopy. Soil between boulders usually moist and loamy.
 - A. Yes – Calcareous Talus Forest/Woodland
 - B. No – Go to 3
3. Community has plants associated with both nutrient-poor and nutrient-rich soils. White ash, hickories, and witch-hazel may be present. Marginal wood-fern, common polypody, and herb Robert are major components of herb layer.
 - A. Yes – Circumneutral Talus Forest/Woodland



All three Talus Forest/Woodland communities may have sugar maple present in the canopy, so be careful in using it as a diagnostic feature.

You can narrow your choices (in most instances) by considering where you are located in Massachusetts.

You may wish to consider identifying the community by identifying the type of rock in the talus, or by going upslope (if practical) and identifying the type of rock cliff, summit, or outcrop from which the talus was derived.

Descriptions of Talus Forest/Woodland Communities

Circumneutral Talus Forest/Woodland

S3

| | |
|---------------------|---|
| Description/Concept | Open to closed canopy on boulder-strewn slopes. Often a gradient of vegetation, with exposed rocks at the base of the cliff above the talus slope, and gradually more trees to the base of the slope. Small slopes may have canopy coverage from surrounding trees. |
| Topography | Slopes, often below cliffs or rock outcrops. |
| Soils/Substrate | Dry to mesic, not very acidic talus slopes of basalt or traprock. |
| Canopy | Open to closed. Scattered and clumped trees. Mixture of deciduous forest species, including: sugar maple, red maple, black birch, paper birch, white ash, pignut hickory, sweet pignut hickory, and northern red oak. |
| Sub-canopy | Species include hop-hornbeam and striped maple. |
| Shrub layer | Tall shrubs. Shrubs include round-leaved dogwood, hazelnut, witch-hazel, maple-leaf viburnum, bush honeysuckle, Virginia creeper, and poison ivy. |
| Herb layer | Sparse. Dominated by vines and ferns. Includes marginal wood-fern, common (rock) polypody, and herb Robert; occasionally clematis and climbing fumitory. Scattered grasses and sedges. Lichens may be present in open conditions. |
| Leaf litter | |

Calcareous Talus Forest/Woodland

S3

| | |
|---------------------|--|
| Description/Concept | Open to closed canopy on boulder-strewn slopes. Often a gradient of vegetation, with exposed calcareous rocks at the base of the cliff above the talus slope, and gradually more trees to the base of the slope. Small slopes may have canopy coverage from surrounding trees. |
| Topography | Slopes, often below cliffs or rock outcrops. |
| Soils/Substrate | Loose talus composed of calcareous boulders such as limestone or dolomite. In rich woods, soil between boulders is usually moist and loamy. |
| Canopy | Scattered and clumped trees. Sugar maple usually dominant. |
| Sub-canopy | Species include hop-hornbeam and striped maple. |
| Shrub layer | Tall shrubs. Shrubs abundant if canopy is open. Shrubs include round-leaved dogwood, downy arrow-wood, and purple flowering raspberry. |
| Herb layer | Dominated by vines and ferns. Includes meadow rue, Jack-in-the-pulpit, white avens, bottlebrush-grass, broad-leaved woodland-sedge, and walking fern. |
| Leaf litter | |

Acidic Talus Forest/Woodland

S4

| | |
|---------------------|--|
| Description/Concept | Open to closed canopy on boulder-strewn slopes. Often a gradient of vegetation, with exposed rocks at the base of the cliff above the talus slope, and gradually more trees to the base of the slope. Small slopes may have closed canopy coverage from surrounding trees. |
| Topography | Loose rocky slopes, often below cliffs or rock outcrops. |
| Soils/Substrate | Talus derived from acidic bedrock. |
| Canopy | Open to closed. Scattered and clumped trees. Mixture of deciduous forest species, including: northern red oak, sugar maple, red maple, black birch, paper birch, yellow birch, gray birch, American beech, hemlock, and white pine. |
| Sub-canopy | |
| Shrub layer | Tall, scattered shrubs. Shrubs include currants, purple-flowering raspberry, mountain maple, striped maple, and maple-leaf viburnum. |
| Herb layer | Dominated by vines and ferns. Includes marginal wood-fern, common (rock) polypody, bracken, Pennsylvania sedge, pale corydalis, silverrod, Virginia creeper, and poison ivy. Scattered grasses and sedges. Lichens often cover exposed rocks. |
| Leaf litter | Ground cover of moss or lichen covered boulders and deciduous litter. |

Known Distribution of Talus Forest/Woodland Communities

| Community Type | Berkshires | Connecticut Valley | Worcester Plateau | Eastern Mass. | Cape & Islands |
|-------------------------------------|------------|--------------------|-------------------|---------------|----------------|
| Acidic Talus Forest/Woodland | X | X | X | | |
| Calcareous Talus Forest/Woodland | X | X | | | |
| Circumneutral Talus Forest/Woodland | | X | X | X | |

Plants Associated with Talus Forest/Woodland Communities

| | Acidic Talus Forest/Woodland | Circumneutral Talus Forest/Woodland | Calcareous Talus Forest/Woodland |
|------------------------------|---------------------------------|--|-------------------------------------|
| Arrow-wood, Downy | | | Occurs |
| Ash, White | | Occurs | |
| Avens, White | | | Occurs |
| Beech, American | Occurs | | |
| Birch, Black | Occurs | Occurs | |
| Birch, Gray | Occurs | | |
| Birch, Paper | Occurs | Occurs | |
| Birch, Yellow | Occurs | | |
| Bottlebrush-grass | | | Occurs |
| Bracken (fern) | Occurs | | |
| Bush Honeysuckle | | Occurs | |
| Clematis | | Occurs | |
| Corydalis, Pale | Occurs | | |
| Currant | Occurs | | |
| Dogwood, Round-leaved | | Occurs | Occurs |
| Fern, Walking | | | Occurs |
| Fumitory, Climbing | | Occurs | |
| Grass | Occurs | Occurs | |
| Hazelnut | | Occurs | |
| Hemlock, Eastern | Occurs | | |
| Herb Robert | | Occurs | |
| Hickory, Pignut | | Occurs | |
| Hickory, Sweet Pignut | | Occurs | |
| Hop-hornbeam | | Occurs | Occurs |
| Jack-in-the-pulpit | | | Occurs |
| Lichen | Occurs | Occurs | |
| Maple, Mountain | Occurs | | |
| Maple, Red | Occurs | Occurs | |
| Maple, Striped | Occurs | Occurs | Occurs |
| Maple, Sugar | Occurs | Occurs | Dominant (usually) |
| Meadow-rue | | | Occurs |
| Moss | Occurs | | |
| Oak, Northern Red | Occurs | Occurs | |
| Pine, White | Occurs | | |
| Poison Ivy | Occurs | Occurs | |
| Polypody, Common (Rock) | Occurs | Occurs | |
| Raspberry, Purple-flowering | Occurs | | Occurs |
| Sedge | Occurs | Occurs | |
| Sedge, Pennsylvania | Occurs | | |
| Silverrod | Occurs | | |
| Viburnum, Maple-leaf | Occurs | Occurs | |
| Virginia Creeper | Occurs | Occurs | |
| Witch-hazel | | Occurs | |
| Woodland-sedge, Broad-leaved | | | Occurs |
| Wood-fern, Marginal | Occurs | Occurs | |

NOTE: This is not an exhaustive list of plant species that occur in these communities. Rather, it is a list of species associated with these communities as identified in Swain and Kearsley (2001.)

Descriptions of Conifer Forest/Woodland Communities

Hemlock Ravine

S4

| | |
|---------------------|---|
| Description/Concept | A hemlock dominated community with 80-100% closure. Little understory. Usually occurs as community within oak-hemlock-white pine community. |
| Topography | Usually on North-facing slopes or ravines. |
| Soils/Substrate | Usually on acidic rock or outcrops. |
| Canopy | Hemlock dominated. Other species at low percentages include red, scarlet, white, and black oaks, and red maple. |
| Sub-canopy | |
| Shrub layer | Sparse. Occasional individuals of canopy species and small patches of mountain laurel. |
| Herb layer | Essentially non-existent. |
| Leaf litter | Covered by needles, twigs, and small branches. |

[Decision Rule: He rv category = >75% hemlock canopy closure on ravines and north-facing slopes.]

Successional White Pine Forest

S5

| | |
|---------------------|---|
| Description/Concept | Old field white pine, several decades after establishment. Other species co-occur, but seldom share dominance. |
| Topography | |
| Soils/Substrate | Abandoned agricultural land, usually pasture. |
| Canopy | White pine, with scattered white oak, northern red oak, and red maple. |
| Sub-canopy | |
| Shrub layer | Variable density, from sparse to thick. Includes elderberry, black cherry, and maple-leaved viburnum. Often includes non-native species such as buckthorn, multiflora rose, and honeysuckle. Lowbush blueberry forms patches mixed with black huckleberry on less disturbed sites. |
| Herb layer | “Thin” or variable. Canada mayflower, starflower, and clubmosses common on formerly plowed soil. Partridgeberry, fringed polygala, and pink lady’s slipper grow in long established sites. Bracken is often common. |
| Leaf litter | Forest floor carpeted with needles. Blackberry vines and poison ivy often cover ground near openings in formerly open, disturbed areas. |

[Decision Rule: WP s category = >75% white pine.]

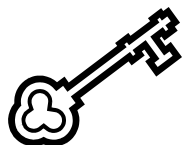
High Elevation Spruce – Fir Forest/Woodland

S2

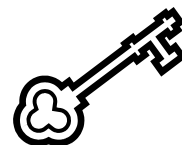
| | |
|---------------------|--|
| Description/Concept | Low diversity coniferous forest of high-elevations, dominated by balsam fir and red spruce. Trees often stunted from wind exposure. |
| Topography | Located on stony slopes or ridgetops of tallest, most exposed mountains in Massachusetts. |
| Soils/Substrate | |
| Canopy | Balsam fir dominant, in association with red spruce, and birches (paper, heart-leaf paper, and yellow.) |
| Sub-canopy | |
| Shrub layer | Where there is light, mountain maple, mountain holly, American mountain-ash, and hobblebush may grow. |
| Herb layer | Bluebead lily, mountain wood sorrel, bunchberry, and clubmoss may be present. |
| Leaf litter | Mosses or thick layer of needles. |

[Decision Rule: SF hi category = >75% spruce-fir (combined) on high elevations.]

MIXED CONIFEROUS-DECIDUOUS FOREST/WOODLAND COMMUNITIES




**Shortcut Key: Check full descriptions and supporting
information following use of key**



- | | |
|---|--|
| 1. Red spruce dominant or co-dominant. | A. Yes – Spruce – Fir Northern Hardwood Forest B. No – Go to 2 |
| 2. Hemlock present, may range from scattered to dominant. | A. Yes – Go to 3 B. No – Go to 5 |
| 3. Northern hardwoods (e.g., sugar maple, yellow birch, paper birch) present, likely characteristic. Shrub layer open, often with clumps of hobblebush, red-berried elderberry, fly honeysuckle, and striped maple. | A. Yes – Northern Hardwoods – Hemlock-White Pine Forest B. No – Go to 4 |
| 4. White, chestnut, and/or red oaks in association with hemlock and white pine. Beech is a common associate. Chestnut commonly occurs in shrub layer. | A. Yes – Oak – Hemlock – White Pine Forest ^a |
| 5. White pine constitutes 25-75% of canopy. | A. Yes – White Pine – Oak Forest ^b B. No – Go to 6 |
| 6. Red cedar constitutes 25-75% of canopy. | A. Yes – Maritime Juniper Woodland B. No – Go to 7 |
| 7. Pitch pine constitutes 25-75% of canopy. | A. Yes – Pitch Pine – Oak Forest B. No – Go to 8 |
| 8. Mixed oak community with pitch pine, red maple, American holly, and sassafras possibly present. | A. Yes – Go to 9 |
| 9. Community is within direct influence of salt spray, tree tops sculpted by wind and salt. | A. Yes – Maritime Oak-Holly Forest B. No – Go to 10 |
| 10. Community is sheltered from daily salt spray, tree tops not sculpted by wind and salt. | A. Yes – Coastal Forest/Woodland ^c |

Footnotes and hints are provided on the next page.

- a. “Pure” stands of American beech are classified as Oak-Hemlock-White Pine, even if there is no oak, hemlock, or white pine present. This is a function of American beech being a component of the oak-hemlock-white pine community that varies both in space and time.
- b. In Southeastern Massachusetts a variant of this community, dominated by terrestrial red maple with white pine and oak, is common. This variant extends from Wrentham south and east toward the coast.
- c. Swain and Kearsley (2001) identify the Coastal Forest/Woodland community as a Mixed Coniferous-Deciduous Forest/Woodland community. However, there are examples of this community that have virtually no coniferous component. As a result, this community may not key out as a Mixed Coniferous-Deciduous Forest/Woodland community. To address this, the community has also been included in the section on Deciduous Forest/Woodlands.

| | |
|---|---|
|  | <p>Some Mixed Coniferous-Deciduous Forest/Woodland communities are not easily identified solely on the basis of vegetation. For example, the Coastal Forest/Woodland Community has vegetation that is similar to both the Pitch Pine-Oak Forest and the White Pine-Oak Forest communities.</p> <p>Because of this you must consider where the community is located to arrive at a correct identification.</p> |
|---|---|

Locations of Mixed Coniferous-Deciduous Forest/Woodland Communities

| Location | Community Type |
|--|---|
| Within daily salt spray influence | Maritime Oak-Holly Forest/Woodland |
| | Maritime Juniper Woodland/Shrubland |
| Coastal, but beyond daily salt spray influence | Coastal Forest/Woodland |
| Beyond reach of salt spray, not coastal | Pitch Pine – Oak Forest |
| | White Pine – Oak Forest |
| | Oak – Hemlock – White Pine Forest |
| | Northern Hardwoods – Hemlock – White Pine |
| | Spruce – Fir – Northern Hardwood Forest |

Understory Characteristics of Mixed Coniferous/Deciduous Forest/Woodland Communities

| Understory | Community Type |
|---|---|
| Ericaceous shrub layer (e.g., blueberry and huckleberry) | Coastal Forest/Woodland |
| | Pitch Pine – Oak Forest |
| | White Pine – Oak Forest (possible) |
| Maritime Shrub Layer (e.g., bayberry, winged sumac) | Maritime Oak – Holly Forest/Woodland |
| | Maritime Juniper Woodland |
| Blueberry present with witch hazel, mountain laurel, and maple-leaved viburnum present. | Oak – Hemlock – White Pine Forest |
| Blueberry and huckleberry absent or nearly so. Diverse understory characteristic of moderately rich soils: hobblebush, red-berried elderberry, fly-honeysuckle, striped maple, intermediate wood-fern, Christmas fern, occasionally spring herbaceous species. | Northern Hardwoods – Hemlock – White Pine |
| Blueberry and huckleberry absent or nearly so. Diverse understory with mountain maple, red-berried elderberry, northern mountain ash, hobblebush, bunchberry, creeping snowberry, and (occasionally) twinflower. Herb layer tends to be sparse. | Spruce – Fir – Northern Hardwood Forest |

Descriptions of Mixed Coniferous-Deciduous Forest/Woodland Communities

Spruce – Fir – Northern Hardwood Forest

S4

| | |
|---------------------|---|
| Description/Concept | A northern and higher elevation mixed spruce – northern hardwood forest. A community of variable dominance. Grades into Northern Hardwoods – Hemlock – White Pine Forest on moister, warmer slopes. |
| Topography | |
| Soils/Substrate | Cool and typically rocky soils, nutrient poor, somewhat dry and acidic. |
| Canopy | Red spruce dominant or... Red spruce co-dominant with sugar maple and America beech, or... Sugar maple and American beech dominant, with abundant yellow birch and smaller amounts of red spruce and/or balsam fir. Hemlock may be abundant or scattered. Paper birch and heart-leaf paper birch usually occur as scattered individuals. |
| Sub-canopy | |
| Shrub layer | Characteristic shrubs include mountain maple, red-berried elderberry, northern mountain-ash, and hobblebush. Low shrub layer of bunchberry, creeping snowberry, and occasionally, twinflower. |
| Herb layer | Sparse, especially when spruce is abundant. Includes intermediate fern, mountain wood-fern, bluebead lily, painted trillium, and wood-sorrel. |
| Leaf litter | |

[Decision Rules: NHS category = >25% and <75% hardwoods, of which >75% is northern hardwoods, and >25% and <75% conifers.]

SFNH category = >75% spruce-fir-hemlock (combined) and >50% spruce-fir combined and <50% hemlock.]

NHSF category = >25% and <75% hardwoods and >25% and <75% spruce-fir.]

Oak – Hemlock – White Pine Forest

S5

| | |
|---------------------|--|
| Description/Concept | A mixed conifer-hardwood forest often occurring on dry, acidic slopes. |
| Topography | Mid-slope on shallow, well-drained soils. Not sensitive to aspect. |
| Soils/Substrate | |
| Canopy | Canopy has oaks (red, white, chestnut), black birch, black cherry, and red maple in association with hemlock and white pine. Relative proportions vary among sites. Beech is a common associate, and may form a monoculture in some instances. |
| Sub-canopy | |
| Shrub layer | Patchy and sparse. Witch-hazel, mountain laurel, lowbush blueberry, and maple-leaf viburnum characteristically present. Chestnut sprouts are common. |
| Herb layer | Sparse, with low diversity. Indian cucumber, wintergreen, wild sarsaparilla, wild oats, starflower, and Canada mayflower typical. |
| Leaf litter | |

[Decision Rules: OKHeWP category = 50-75% hardwoods; 25-50% hemlock; 0-25% white pine;

HeWpOk category = 25-75% hemlock; 0-50% white pine; 25-50% hardwoods.]

Northern Hardwoods – Hemlock – White Pine Forest

S5

| | |
|---------------------|---|
| Description/Concept | Closed canopy forest dominated by a mix of evergreen and deciduous trees. Sparse shrub and herb layer. Variable species composition: ranges from hemlock in pure stands to a deciduous forest with scattered hemlocks. |
| Topography | North facing slopes and ravines (and northern areas). |
| Soils/Substrate | Dry to mesic, moderately acidic conditions. |
| Canopy | Variable combinations of hemlock, sugar maple, yellow birch, black cherry and northern red oak, and white pine. Paper birch, quaking aspen, red maple, and yellow birch are often scattered among the canopy. |
| Sub-canopy | |
| Shrub layer | Open, with scattered clumps of shrubs. Hobblebush, red-berried elderberry, fly-honeysuckle, and striped maple typical of shrubs. |
| Herb layer | Sparse but diverse. Intermediate wood-fern, Christmas fern, clubmosses, Canada mayflower, white wood-aster, and wild sarsaparilla typical. Occasional spring herbaceous species including: painted trillium; early yellow violet, broad-leaved spring beauty; and trout-lily. |
| Leaf litter | |

**[Decision Rules: NHHwP category = 50-75% hardwoods, 25-50% hemlock, and 0-25% white pine.
HeWpNH category = 25-75% hemlock, 0-50% white pine, and 25-50% hardwoods.
NHwP category = 50-75% hardwoods and 25-50% white pine.
WpNH category = 50-75% white pine and 25-50% hardwoods.
HeWp category = >75% hemlock-white pine (combined) of which >25% hemlock.]**

White Pine – Oak Forest

S5

| | |
|---------------------|--|
| Description/Concept | A forest of mixed dominance with oaks and white pine in the canopy. Often in successional sequence from white pine forest. |
| Topography | On moraine or till. |
| Soils/Substrate | |
| Canopy | White pine and oaks (red, scarlet, black, white, chestnut) dominate the canopy in varying proportions. Pitch pine, white birch, red maple, and black birch occur regularly in low numbers. Southern areas have pignut hickory and sassafras. |
| Sub-canopy | |
| Shrub layer | Chestnut present as shrubby tree. Usually prominent heath shrub layer , including lowbush blueberry, huckleberry, mountain, laurel, and sheep laurel. Maple-leaf viburnum may also be present. |
| Herb layer | Sparse. Characteristic species include bracken, wild sarsaparilla, Canada mayflower, wintergreen, partridge-berry, pink lady’s slipper, cow-wheat, and whorled loosestrife. |
| Leaf litter | |

**[Decision Rules: WpOk category = 50-75% white pine; 25-50% hardwoods;
CHWp category = 50-75% hardwoods; 25-50% white pine.]**

Maritime Juniper Woodland/Shrubland

S1

| | |
|---------------------|---|
| Description/Concept | Predominantly evergreen woodland/shrubland. Within direct influence of ocean salt and spray. Shorter than interior forests. May be protected from direct spray by crests of dunes. |
| Topography | Tend to occur in interdunal areas, backs of dunes, exposed bluffs, salt marsh borders, and, to a lesser extent, on rocky headlands. |
| Soils/Substrate | Sandy, rocky headlands. |
| Canopy | Trees short (<5 m) and sculpted by wind and salt spray. Red cedar dominates but occurs in variable, usually low densities. In association with pitch pine, oaks, red maple, American holly, and black cherry. |
| Sub-canopy | |
| Shrub layer | Bayberry, winged sumac, and beach heather often in association with canopy species listed above. |
| Herb layer | Highly variable. Little bluestem, American beach grass, and sedges. |
| Leaf litter | |

[Decision Rules: Ju ma community = >50% of 1, 2, or 3 species: red cedar, pitch pine, central hardwoods, and 25-75% red cedar.]

NOTE: This community is listed in both the Shrublands and the Forest/Woodlands sections of this guide.

Pitch Pine – Oak Forest

S5

| | |
|---------------------|---|
| Description/Concept | Dry oak/pine forest. This is the matrix forest in Southeastern Massachusetts. Inland, away from regular oceanic influences. Proportion of species variable, ranging from predominantly pine to predominantly oaks. Open canopy with thick understory to closed canopy with scattered clumps of shrubs. |
| Topography | Moraines, till, outwash, southerly exposures and rocky slopes. |
| Soils/Substrate | Dry, low nutrient acidic soils. |
| Canopy | Pitch pine and tree oaks (black, scarlet, chestnut, and white). White pine and red maple occasionally contribute to the canopy. |
| Sub-canopy | |
| Shrub layer | Scattered, often continuous, openings of scrub oak and dwarf chinquapin oak. Often continuous, low ericaceous shrub layer. Common species are black huckleberry and lowbush blueberries. Briers may form dense barriers around openings. |
| Herb layer | Sparse, with bracken, wild sarsaparilla, wintergreen, Pennsylvania sedge, and pink lady's slipper. |
| Leaf litter | |

**[Decision Rules: PpOK category = >50% pitch pine and oaks; with 25-75% pitch pine and 25-75% oak;
PpOk sb category = >50% pitch pine and scrub oak; with 25-75% of each;
PP/OK category = >75% pitch pine.]**

Maritime Oak – Holly Forest/Woodland**S1**

| | |
|---------------------|--|
| Description/Concept | Mixed deciduous/evergreen forest/woodland within salt spray zone. Treetops sculpted by wind and salt. Trees tend to be <10 m. |
| Topography | Bluffs, backs of dunes, interdunal areas, salt marsh borders, and rocky headlands. |
| Soils/Substrate | |
| Canopy | Scarlet oak, black oak, other oaks, American holly, sassafras, black gum, black cherry are commonly present in variable amounts. Pitch pine and eastern red cedar occur in variable amounts. |
| Sub-canopy | |
| Shrub layer | Include bayberry, winged sumac, and sweet pepper-bush. Vines may be dense on edges; including catbrier, poison ivy, Virginia creeper, and/or grape. In low (i.e., wet) areas may include azaleas, viburnums, high bush blueberry, and winterberry. |
| Herb layer | Highly variable, may include grasses and sedges. In low (i.e., wet) areas species may include columbine, starry Solomon's seal, and skunk meadow-rue. |
| Leaf litter | |

Coastal Forest/Woodland**S3**

| | |
|---------------------|---|
| Description/Concept | Occurs near the ocean, but sheltered from daily salt spray. Shorter than inland forests and taller than maritime forests. Found in more protected areas along the coast (e.g., behind dunes, behind maritime forests). Coastal and maritime forests grade into each other. Vines on edges and openings. |
| Topography | |
| Soils/Substrate | |
| Canopy | Scarlet, black, white, and chestnut oaks are dominant. Post oak important in Buzzards Bay area and along portions of Cape Cod Bay. Red maple, sassafras, black cherry, black gum, American beech, pitch pine, and white pine commonly occur. (Usually low %, but may be abundant.) |
| Sub-canopy | American holly is a regular associate in Southeastern Massachusetts. (If abundant it is a Maritime Oak/Holly Forest.) |
| Shrub layer | A low shrub, heath layer. Often dense, particularly near edges. Dominated by lowbush blueberries and black huckleberry. Sweet pepper-bush abundant at some sites. |
| Herb layer | Typically sparse. Typical species include Pennsylvania sedge, bracken, wintergreen, wild sarsaparilla. Greater species diversity under canopy openings, little bluestem, Canadian rockrose, bush clovers, milkworts, and bearberry occur. |
| Leaf litter | |

NOTE: This community has been included in both the Mixed Coniferous-Deciduous and Deciduous Forest sections. This has been done to reflect the variation observed in this community. Officially, NH&ESP lists it as a Mixed Coniferous – Deciduous community.

Plants Associated with Mixed Coniferous – Deciduous Forest/Woodland Communities

| | Spruce-Fir - Northern Hardwoods | Northern Hardwood - Hemlock - White Pine | Oak - Hemlock - White Pine | White Pine - Oak | Maritime Juniper | Pitch Pine Oak | Maritime Oak - Holly | Coastal Forest |
|-------------------------|---------------------------------------|---|----------------------------------|---------------------|---------------------|-------------------|-------------------------|-------------------|
| Aspen, Quaking | | Occurs | | | | | | |
| Bayberry | | | | | Occurs | | Occurs | |
| Azalea | | | | | | | Occurs | |
| Beachgrass, American | | | | | Occurs | | | |
| Bearberry | | | | | | | | Occurs |
| Beech, American | (Co-)Dominant | | Common | | | | | Occurs |
| Birch, Black | | | Char. | Occurs | | | | |
| Birch, Heart-leaf Paper | Occurs | | | | | | | |
| Birch, Paper | Occurs | Occurs | | | | | | |
| Birch, White | | | | Occurs | | | | |
| Birch, Yellow | Abundant | Common | | | | | | |
| Blueberry, Highbush | | | | | | | Occurs | |
| Blueberry, Lowbush | | | Char. | Occurs | | Char. | | Char. |
| Bluestem, Little | | | | | Occurs | | | Occurs |
| Bracken (fern) | | | | Char. | | Occurs | | Occurs |
| Bunchberry | Occurs | | | | | | | |
| Bush-clover | | | | | | | | Occurs |
| Catbrier | | | | | | Occurs | Occurs | |
| Cedar, Eastern Red | | | | | Dominant | | Occurs | |
| Cherry, Black | | Common | Char. | | Occurs | | Comm. Pres. | Occurs |
| Chestnut, American | | | Common | Occurs | | | | |
| Clubmoss | | Occurs | | | | | | |
| Columbine | | | | | | | Occurs | |
| Cow-wheat | | | | Char. | | | | |
| Elderberry, Red-berried | Char. | Common | | | | | | |
| Fern, Christmas | | Occurs | | | | | | |
| Fern, Intermediate | Occurs | | | | | | | |
| Fir, Balsam | Occurs | | | | | | | |
| Fly Honeysuckle | | Common | | | | | | |
| Grape | | | | | | | Occurs | |
| Grass | | | | | | | Occurs | |
| Gum, Black | | | | | | | Comm. Pres. | Occurs |
| Heather, Beach | | | | | Occurs | | | |
| Hemlock, Eastern | Occurs | Common | Char. | | | | | |
| Hickory, Pignut | | | | Occurs | | | | |
| Hobblebush | Char. | Common | | | | | | |
| Holly, American | | | | | Occurs | | Comm. Pres. | Occurs |
| Huckleberry, Black | | | | Occurs | | Char. | | Char. |
| Indian Cucumber | | | Typical | | | | | |
| Lady's Slipper, Pink | | | | Char. | | Occurs | | |
| Laurel, Mountain | | | Char. | Occurs | | | | |
| Laurel, Sheep | | | | Occurs | | | | |
| Lily, Blue-bead | Occurs | | | | | | | |
| Lily, Trout- | | Occurs | | | | | | |
| Loosestrife, Whorled | | | | Char. | | | | |
| Maple, Mountain | Char. | | | | | | | |
| Maple, Red | | Occurs | Char. | Occurs | Occurs | Occurs | Comm. Pres. | Occurs |
| Maple, Striped | | Common | | | | | | |

Plants Associated with Mixed Coniferous – Deciduous Forest/Woodland Communities (continued)

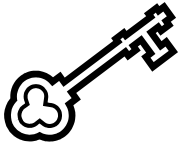
| | Spruce – Fir Northern Hardwoods | Northern Hardwood - Hemlock - -White Pine | Oak- Hemlock- White Pine | White Pine Oak Forest | Maritime Juniper | Pitch Pine Oak | Maritime Oak-Holly | Coastal Forest |
|-----------------------------|---------------------------------------|--|--------------------------------|-----------------------------|---------------------|-------------------|-----------------------|-------------------|
| Maple, Sugar | (Co-)Dominant | Common | | | | | | |
| Mayflower, Canada | | Occurs | Typical | Char. | | | | |
| Meadow-rue, Skunk | | | | | | | Occurs | |
| Milkwort | | | | | | | | Occurs |
| Mountain-Ash, Northern | Char. | | | | | | | |
| Oak | | | | | Occurs | | Occurs | |
| Oak, Black | | | | Dominant | | Dominant | Comm. Pres. | Dominant |
| Oak, Chestnut | | | Char. | Dominant | | Dominant | | Dominant |
| Oak, Dwarf Chinquapin | | | | | | Occurs | | |
| Oak, Northern Red | | Common | Char. | Dominant | | | | |
| Oak, Post | | | | | | | | Occurs |
| Oak, Scarlet | | | | Dominant | | Dominant | Comm. Pres. | Dominant |
| Oak, Scrub | | | | | | Occurs | | |
| Oak, White | | | Char. | Dominant | | Dominant | | Dominant |
| Oats, Wild | | | Typical | | | | | |
| Partridge Berry | | | | Char. | | | | |
| Pepper-bush, Sweet | | | | | | | Occurs | Occurs |
| Pine, Pitch | | | | Occurs | Occurs | Dominant | Occurs | Occurs |
| Pine, White | | Common | Char. | Dominant | | Occurs | | Occurs |
| Poison Ivy | | | | | | | Occurs | |
| Rockrose, Canadian | | | | | | | | Occurs |
| Sarsaparilla, Wild | | Occurs | Typical | Char. | | Occurs | | Occurs |
| Sassafras | | | | Occurs | | | Comm. Pres. | Occurs |
| Sedge | | | | | Occurs | | Occurs | |
| Sedge, Pennsylvania | | | | | | Occurs | | Occurs |
| Snowberry, Creeping | Occurs | | | | | | | |
| Solomon's Seal, Starry | | | | | | | Occurs | |
| Sorrel, Wood | Occurs | | | | | | | |
| Spring Beauty, Broad-leaved | | Occurs | | | | | | |
| Spruce, Red | (Co-)Dominant | | | | | | | |
| Starflower | | | Typical | | | | | |
| Sumac, Winged | | | | | Occurs | | Occurs | |
| Trillium, Painted | Occurs | Occurs | | | | | | |
| Twinflower | Occurs | | | | | | | |
| Viburnum, Maple-leaf | | | Char. | Occurs | | | | |
| Violet, Early Yellow | | Occurs | | | | | | |
| Virginia Creeper | | | | | | | Occurs | |
| Winterberry | | | | | | | Occurs | |
| Wintergreen | | | Typical | Char. | | Occurs | | Occurs |
| Witch-Hazel | | | Char. | | | | | |
| Wood-Aster, White | | Occurs | | | | | | |
| Wood-fern, Intermediate | | Occurs | | | | | | |
| Wood-fern, Mountain | Occurs | | | | | | | |

Comm. Pres. = Commonly Present

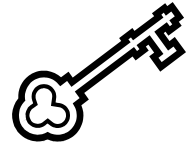
Char. = Characteristic

NOTE: This is not an exhaustive list of plant species that occur in these communities. Rather, it is a list of species associated with these communities as identified in Swain and Kearsley (2001.)

DECIDUOUS FOREST/WOODLAND COMMUNITIES



Shortcut Key: Check full descriptions following use of key



1. Shrub and herbaceous layer typical of wetlands and/or mesic areas. Water flowing or seeping from ground.
 - A. Yes – Go to 2
 - B. No – Go to 4
2. Calcareous indicator species, (e.g., shrubby cinquefoil, alder-leaf buckthorn, wild black currant, yellow sedge) present.
 - A. Yes – Calcareous Forest Seep
 - B. No – Go to 3
3. Shrub and herb layer characteristic of typical (i.e. not calcareous) wetlands present.
 - A. Yes – Forest Seep
4. Sugar maple present and/or dominant.
 - A. Yes – Go to 5
 - B. No – Go to 9
5. Yellow oak present and/or dominant, site located on shallow rock.
 - A. Yes – Yellow Oak Dry Calcareous Forest
 - B. No – Go to 6
6. Hickories in canopy and hop-hornbeam present as regular and abundant sub-canopy tree. Layer of nearly continuous graminoids.
 - A. Yes – Hickory – Hop-hornbeam Forest
 - B. No – Go to 7
7. Northern red oak, American beech, and black birch characterize canopy.
 - A. Yes – Red Oak – Sugar Maple Transition Forest
 - B. No – Go to 8
8. Elm and/or basswood present and characteristic. Oaks do not dominate canopy.
 - A. Yes – Rich Mesic Forest
 - B. No – Dry, Rich Acidic Oak Forest
9. Quaking aspen, white birch, red maple and/or black cherry dominate community. Oaks are not dominant.
 - A. Yes – Successional Northern Hardwoods
 - B. No – Go to 10

Key continued on next page.

Descriptions of Deciduous Forest Communities

Calcareous Forest Seep

S2

| | |
|---------------------|---|
| Description/Concept | Within forests on slopes, with springs or seeps containing water with dissolved calcium. Canopy similar to surrounding forest, shrub and herb layer species typical of calcareous wetlands. |
| Topography | Slope. |
| Soils/Substrate | |
| Canopy | Usually occur within rich northern hardwoods, such as sugar maple, white ash, American beech, black birch, and white oak. Also occurs within white pine and hickories. Black ash may be present. |
| Sub-canopy | |
| Shrub layer | Witch-hazel, ironwood, alternate-leaved dogwood, striped maple, and young of canopy species. |
| Herb layer | Varies from sparse to continuous. Includes many widespread wetland species, such as sensitive fern, yellow jewelweed, and Jack-in-the-pulpit. Key indicators include: shrubby cinquefoil, alder-leaf buckthorn, wild black currant, yellow sedge, porcupine sedge, hoary willow, autumn willow, purple avens, rough-leaved goldenrod, and grass-of-Parnassus. |
| Leaf litter | |

Forest Seep

S4

| | |
|---------------------|---|
| Description/Concept | Forest on slopes with springs or seeps. Canopy similar to surrounding forest. |
| Topography | Slope. |
| Soils/Substrate | |
| Canopy | Usually northern hardwood species, such as sugar maple, white ash, red maple, yellow birch, and paper birch. Hemlock, red spruce, and white pines may occur scattered among hardwoods. |
| Sub-canopy | |
| Shrub layer | Typical of wetlands or mesic areas. |
| Herb layer | Typical of wetlands or mesic areas. Ferns typical, including cinnamon fern; ostrich fern; silvery spleenwort, rattlesnake fern, and Christmas fern. Golden saxifrage, scouring rush, false hellebore, water avens, and sedges also occur. |
| Leaf litter | |

Yellow Oak Dry Calcareous Forest**S2**

| | |
|---------------------|---|
| Description/Concept | A dry, often open, oak – sugar maple forest with a rich understory. |
| Topography | Well-drained slopes or low ridges underlain with calcareous rocks. |
| Soils/Substrate | Shallow rock. |
| Canopy | Yellow oak (characteristic) growing mixed with sugar maple, white oak, and black oak; associated with white ash and shagbark hickory. Scattered white pine and northern red oak occur regularly. |
| Sub-canopy | Hop-hornbeam, hackberry, and flowering dogwood, and bladderwort. |
| Shrub layer | |
| Herb layer | Rich in species, including four-leaved milkweed, sickle-pod, thread-leaved sedge, broad-leaved ragwort, and wild geranium. In disturbed areas, eastern red cedar, and quaking aspen may occur. |
| Leaf litter | |

Hickory – Hop-hornbeam Forest/Woodland**S4**

| | |
|---------------------|--|
| Description/Concept | Open, mixed hardwood forest. Great variation in environmental conditions among sites. Occurs in pockets of larger oak forests. |
| Topography | Generally located in mid-slope on southern or eastern exposures below balds, outcrops, and traprock ridges. |
| Soils/Substrate | Deep, moist soils. |
| Canopy | Variable mixture of hardwoods, including: sugar maple, white ash, and northern red oak. |
| Sub-canopy | Hickories (shagbark, pignut, sweet pignut) and hop-hornbeam regular and abundant. |
| Shrub layer | |
| Herb layer | Nearly continuous cover of graminoids, including: Pennsylvania sedge, other sedges, grasses (e.g., bottlebush grass), poverty grass, and Canada bluegrass, with scattered three-lobed violets, hepaticas, and tick-trefoils. |
| Leaf litter | |

Red Oak – Sugar Maple Transition Forest**S4**

| | |
|---------------------|--|
| Description/Concept | Mix of northern (maples) and southern (oaks) hardwoods. May be old field successional or formerly managed woodlots. |
| Topography | Mid-slope. |
| Soils/Substrate | Moderate nutrients. Not very acidic. |
| Canopy | Red oak, sugar maple, beech, and black birch with admixture of white pine and hemlock. White oak, red maple, white ash, and yellow birch are regular associates. |
| Sub-canopy | |
| Shrub layer | Striped maple, maple-leaf viburnum, hobblebush and witch-hazel are typical shrubs. Lowbush blueberry is abundant in more coniferous dominated sites. |
| Herb layer | Neither dense nor sparse; often with patches of clonal species. Wild sarsaparilla, bracken, hay-scented fern, clubmosses, Indian cucumber, Canada mayflower, whorled wood aster, and broad-leaved woodland sedge. |
| Leaf litter | |

[Decision Rule: RoHm = >25% red oak and >25% sugar maple.]

Rich, Mesic Forest Community**S3**

| | |
|---------------------|---|
| Description/Concept | Dominated by sugar maple. Understory species may be diagnostic. |
| Topography | North or east facing concave middle to lower slopes. |
| Soils/Substrate | Enriched by down slope movement. Usually deep, rich in nutrients. |
| Canopy | Dominated by sugar maple. White ash, bitternut hickory, elm, and basswood characteristic. |
| Sub-canopy | Hop-hornbeam common. |
| Shrub layer | Sparse. Alternate-leaved dogwood, leatherwood, or red-berried elderberry may be present. |
| Herb layer | Diverse, with abundant spring ephemerals in moist, nutrient rich environment. Combinations of any of the following indicates a rich, mesic forest community: bloodroot, maidenhair fern, blue cohosh, sweet cicely, Dutchman's breeches, squirrel corn, toothwort, wild leek, wild ginger, white baneberry, Goldie's fern, and zigzag goldenrod. Plantain-leaf sedge is a good indicator of this community, and is visible year-round. |
| Leaf litter | <1 year's accumulation; quickly incorporated into soil. |

Dry, Rich Acidic Oak Forest**S4**

| | |
|---------------------|--|
| Description/Concept | Deciduous forest with rich understory of herbs and grasses. |
| Topography | Mid-slope and coves, overwash and down-slope movement produce enriched soil. |
| Soils/Substrate | Slightly acid, often rocky of intermediate fertility. Well-drained loams. |
| Canopy | Dominated by a mixture of oaks (red, white, scarlet), maples (red and sugar), white ash, and hickories (shagbark, pignut, sweet pignut.) |
| Sub-canopy | Open. Flowering dogwood and hop-hornbeam. |
| Shrub layer | Fairly sparse. Fewer ericaceous plants than other oak forests. Maple-leaf viburnum and saplings of canopy species. |
| Herb layer | Rich. Perfoliate bellwort, four-leaved milkweed, early meadow rue, false foxgloves, wild coffee, bush clovers, tick trefoils, and sedges. |
| Leaf litter | |

Successional Northern Hardwoods**S4**

| | |
|---------------------|---|
| Description/Concept | A broadly defined time sequence of forest communities, ranging from young sprouts to mature. Occurs in areas with past disturbance (e.g., cutting, hurricane, or fire) within northern hardwood areas. |
| Topography | Slope. |
| Soils/Substrate | |
| Canopy | Seldom closed. Quaking aspen, white birch, red maple, and/or black cherry dominate. Gray birch common on well drained soils. Pin cherry is a common associate. |
| Sub-canopy | Young trees of shade tolerant species. |
| Shrub layer | May be dense or open. Species variable, depending on surrounding seed sources and disturbance history. |
| Herb layer | Species variable, depending on surrounding seed sources and disturbance history. |
| Leaf litter | |

[Decision Rules: NHs = >50% shade intolerant northern hardwood species (singly or combined.)]

Ridgetop Chestnut Oak Forest/Woodland**S4**

| | |
|---------------------|--|
| Description/Concept | Open forest of dry ridge tops. |
| Topography | On upper south or southwest facing slopes. |
| Soils/Substrate | Dry sites with thin soil over bedrock. |
| Canopy | Dominated by chestnut oak. Associates include black, red, scarlet, and/or white oaks; shagbark and pignut hickories, red maple, hemlock, and white and pitch pines. |
| Sub-canopy | |
| Shrub layer | Often dense red cedar, scrub oak, dwarf chinquapin oak, lowbush blueberries, huckleberry, and mountain laurel. |
| Herb layer | Sparse. Includes false foxgloves, sedges, bracken, and wintergreen. |
| Leaf litter | Deep oak leaf litter. |

Oak – Hickory Forest**S4**

| | |
|---------------------|--|
| Description/Concept | Hardwood forest dominated by oaks, hickories mixed in at lower density. Broadly defined, variable, forest type. Hickory seldom dominant enough to warrant being part of community name. |
| Topography | Upper slopes, ridge tops, usually with west and south facing aspects. |
| Soils/Substrate | Well drained sites. |
| Canopy | Dominated by one or more oak species (red, white, black, scarlet). One or more hickories mixed in at lower densities. Other trees include ash, black birch, sassafras, and red maple. |
| Sub-canopy | Hop-hornbeam, flowering dogwood, shadbush, chestnut, and witch-hazel. |
| Shrub layer | Low, common, diverse. Maple-leaved viburnum, blueberries, New Jersey tea, hazelnuts, and gray dogwood are characteristic. |
| Herb layer | Richer than many oak forests. Typical plants include hepatica, silverrod, tick-trefoil, wild sarsaparilla, rattlesnake weed, false Solomon's seal, and Pennsylvania sedge. |
| Leaf litter | |

Black Oak – Scarlet Oak Forest/Woodland**S3/S4**

| | |
|---------------------|--|
| Description/Concept | Fairly open, oak/heath community; maintained by regular light fire. |
| Topography | Dry, sandy, or rocky slopes; other xeric sites. |
| Soils/Substrate | Sand/rock. |
| Canopy | Dominated by black and scarlet oak. White oak and red maple are common associates. |
| Sub-canopy | Sparse. Gray birch, black cherry, sassafras, flowering dogwood, and shadbush. |
| Shrub layer | Dense and clumped. Lowbush blueberry, huckleberry, scrub oak; also maple-leaf viburnum and American hazelnut. |
| Herb layer | Scattered and open. Sedges (including Pennsylvania), bracken, and pink lady's slipper. |
| Leaf litter | Deep oak leaf litter. |

Coastal Forest/Woodland**S3**

| | |
|---------------------|---|
| Description/Concept | Occurs near the ocean, but sheltered from daily salt spray. Shorter than inland forests and taller than maritime forests. Found in more protected areas along the coast (e.g., behind dunes, behind maritime forests). Coastal and maritime forests grade into each other. Vines on edges and openings. |
| Topography | |
| Soils/Substrate | |
| Canopy | Scarlet, black, white, and chestnut oaks are dominant. Post oak important in Buzzards Bay area and along portions of Cape Cod Bay. Red maple, sassafras, black cherry, black gum, American beech, pitch pine, and white pine commonly occur. (Usually low %, but may be abundant.) |
| Sub-canopy | American holly is a regular associate in Southeastern Massachusetts. (If abundant it is a Maritime Oak/Holly Forest.) |
| Shrub layer | A low shrub, heath layer. Often dense, particularly near edges. Dominated by lowbush blueberries and black huckleberry. Sweet pepper-bush abundant at some sites. |
| Herb layer | Typically sparse. Typical species include Pennsylvania sedge, bracken, wintergreen, wild sarsaparilla. Greater species diversity under canopy openings, little bluestem, Canadian rockrose, bush-clovers, milkworts, and bearberry occur. |
| Leaf litter | |

NOTE: This community has been included in both the Mixed Coniferous-Deciduous and Deciduous Forest sections. This has been done to reflect the variation observed in this community. Officially, NH&ESP lists it as a Mixed Coniferous – Deciduous community.

Mixed Oak Forest**S5**

| | |
|---------------------|---|
| Description/Concept | Broadly defined community of tree oaks. |
| Topography | |
| Soils/Substrate | Dry soils or exposed slopes. |
| Canopy | A variable mix of oaks (black, scarlet, red, white, chestnut) dominates the canopy. Somewhat open. |
| Sub-canopy | Dense patches. Saplings of canopy species plus gray birch, quaking and big-toothed aspen, black birch, red maple, and chestnut in dense patches. |
| Shrub layer | Dense patches. Blueberries, huckleberry, sweet fern, scrub oak, and mountain laurel. |
| Herb layer | Scattered. Pennsylvania sedge, poverty grass, wild sarsaparilla, pinweed, and pale corydalis. |
| Leaf litter | |

Plants Associated with Deciduous Forest/Woodland Communities
Part 1. Seeps and communities with sugar maple

| | Calcareous Forest Seep | Forest Seep | Yellow Oak Dry Calcareous Forest | Hickory Hop-hornbeam | Red Oak - Sugar Maple Transition | Rich Mesic Forest | Dry, Rich Acidic Oak Forest |
|---------------------------|------------------------|-------------|----------------------------------|----------------------|----------------------------------|-------------------|-----------------------------|
| Ash, Black | Occurs | | | | | | |
| Ash, White | Occurs | Occurs | Occurs | Dominant | Occurs | Char. | Dominant |
| Aspen, Quaking | | | Occurs | | | | |
| Avens, Purple | Indicator | | | | | | |
| Avens, Water | | Occurs | | | | | |
| Baneberry, White | | | | | | Occurs | |
| Basswood | | | | | | Char. | |
| Beech, American | Occurs | | | | Dominant | | |
| Bellwort, Perfoliate | | | | | | | Occurs |
| Birch, Black | Occurs | | | | Dominant | | |
| Birch, Paper | | Occurs | | | | | |
| Birch, Yellow | | Occurs | | | Occurs | | |
| Bladderwort | | | Occurs | | | | |
| Bloodroot | | | | | | Occurs | |
| Bracken (fern) | | | | | Occurs | | |
| Buckthorn, Alder-leaf | Indicator | | | | | | |
| Bush Clover | | | | | | | Occurs |
| Cedar, Eastern Red | | | Occurs | | | | |
| Cicely, Sweet | | | | | | Occurs | |
| Cinquefoil, Shrubby | Indicator | | | | | | |
| Clubmoss | | | | | Occurs | | |
| Coffee, Wild | | | | | | | Occurs |
| Cohosh, Blue | | | | | | Occurs | |
| Currant, Wild Black | Indicator | | | | | | |
| Dogwood, Alternate-leaved | Occurs | | | | | Occurs | |
| Dogwood, Flowering | | | Occurs | | | | Occurs |
| Dutchman's Breeches | | | | | | Occurs | |
| Elderberry, Red-berried | | | | | | Occurs | |
| Elm | | | | | | Char. | |
| False Foxglove, Downy | | | | | | | Occurs |
| False Foxglove, Fern-leaf | | | | | | | Occurs |
| False Foxglove, Smooth | | | | | | | Occurs |
| False Hellebore | | Occurs | | | | | |
| Fern, Christmas | | Occurs | | | | | |
| Fern, Cinnamon | | Occurs | | | | | |
| Fern, Goldie's (Wood) | | | | | | Occurs | |
| Fern, Hay-scented | | | | | Occurs | | |
| Fern, Maidenhair | | | | | | Occurs | |

Plants Associated with Deciduous Forest/Woodland Communities
Part 1. Seeps and communities with sugar maple (continued)

| | Calcareous Forest Seep | Forest Seep | Yellow Oak Dry Calcareous Forest | Hickory Hop-hornbeam | Red Oak - Sugar Maple Transition | Rich Mesic Forest | Dry, Rich Acidic Oak Forest |
|-------------------------|------------------------|-------------|----------------------------------|----------------------|----------------------------------|-------------------|-----------------------------|
| | | | | | | | |
| Fern, Ostrich | | Occurs | | | | | |
| Fern, Rattlesnake | | Occurs | | | | | |
| Fern, Sensitive | Occurs | | | | | | |
| Geranium, Wild | | | Occurs | | | | |
| Ginger, Wild | | | | | | Occurs | |
| Goldenrod, Rough-leaved | Indicator | | | | | | |
| Goldenrod, Zigzag | | | | | | Occurs | |
| Grass, Bottlebrush | | | | Char. | | | |
| Grass, Canada Blue | | | | Char. | | | |
| Grass, Poverty | | | | Char. | | | |
| Grass-of-Parnassus | Indicator | | | | | | |
| Hackberry | | | Occurs | | | | |
| Hemlock, Eastern | | Occurs | | | | | |
| Hepatica | | | | Occurs | | | |
| Hickory | Occurs | | | | | | |
| Hickory, Bitternut | | | | | | Char. | |
| Hickory, Pignut | | | | Regular | | | Dominant |
| Hickory, Shagbark | | | Occurs | Regular | | | Dominant |
| Hickory, Sweet Pignut | | | | Regular | | | Dominant |
| Hobblebush | | | | | Occurs | | |
| Hop-hornbeam | | | Occurs | Regular | | Occurs | Occurs |
| Indian Cucumber | | | | | Occurs | | |
| Ironwood | Occurs | | | | | | |
| Jack-in-the-pulpit | Occurs | | | | | | |
| Jewelweed | Occurs | | | | | | |
| Leatherwood | | | | | | Occurs | |
| Maple, Red | | Occurs | | | Occurs | | Dominant |
| Maple, Striped | Occurs | | | | Occurs | | |
| Maple, Sugar | Occurs | Occurs | Occurs | Dominant | Dominant | Dominant | Dominant |
| Mayflower, Canada | | | | | Occurs | | |
| Meadow-rue, Early | | | | | | | Occurs |
| Milkweed, Four-leaved | | | Occurs | | | | Occurs |
| New Jersey Tea | | | | | | | |
| Oak, Black | | | Occurs | | | None | Dominant |
| Oak, Chestnut | | | | | | None | |
| Oak, Northern Red | | | Occurs | Dominant | Dominant | Occurs | Dominant |
| Oak, Scarlet | | | | | | None | Dominant |

Plants Associated with Deciduous Forest/Woodland Communities
Part 1. Seeps and communities with sugar maple (continued)

| | Calcareous Forest Seep | Forest Seep | Yellow Oak Dry Calcareous Forest | Hickory Hop-hornbeam | Red Oak - Sugar Maple Transition | Rich Mesic Forest | Dry, Rich Acidic Oak Forest |
|------------------------------|------------------------|-------------|----------------------------------|----------------------|----------------------------------|-------------------|-----------------------------|
| Oak, Swamp White | | | | | | None | |
| Oak, White | Occurs | | Occurs | | Occurs | None | Dominant |
| Oak, Yellow | | | Characteristic | | | | |
| Pine, White | Occurs | | Occurs | | | | |
| Ragwort, Broad-leaved | | | Occurs | | | | |
| Rush, Scouring | | Occurs | | | | | |
| Sarsaparilla, Wild | | | | | Occurs | | |
| Saxifrage, Golden | | Occurs | | | | | |
| Sedge | | Occurs | | Char. | | | |
| Sedge, Pennsylvania | | | | Char. | | | |
| Sedge, Plantain-leaf | | | | | | Indicator | |
| Sedge, Porcupine | Indicator | | | | | | |
| Sedge, Thread-leaved | | | Occurs | | | | |
| Sedge, Yellow | Indicator | | | | | | |
| Sicklepod | | | Occurs | | | | |
| Spleenwort, Silvery | | Occurs | | | | | |
| Spruce, Red | | Occurs | | | | | |
| Squirrel Corn | | | | | | Occurs | |
| Tick-trefoil | | | | Occurs | | | Occurs |
| Toothwort | | | | | | Occurs | |
| Viburnum, Maple-leaf | | | | | Occurs | Occurs | |
| Violet, Three-lobed | | | | Occurs | | | |
| Willow, Autumn | Indicator | | | | | | |
| Willow, Hoary | Indicator | | | | | | |
| Witch-hazel | Occurs | | | | | | |
| Wood-Aster, Whorled | | | | | Occurs | | |
| Woodland-sedge, Broad-leaved | | | | | Occurs | | |

Char. = Characteristic

NOTE: This is not an exhaustive list of plant species that occur in these communities. Rather, it is a list of species associated with these communities as identified in Swain and Kearsley (2001.)

Plants Associated with Deciduous Forest/Woodland Communities
Part 2. Communities without sugar maple

| | Successional Northern Hardwoods | Ridgetop Chestnut Oak | Oak - Hickory | Black Oak – Scarlet Oak | Mixed Oak | Coastal Forest/ Woodland |
|---------------------------|---------------------------------------|--------------------------|---------------|----------------------------|--------------|-----------------------------|
| Ash, White | | | Occurs | | | |
| Aspen, Big toothed | | | | | Occurs | |
| Aspen, Quaking | Dominant | | | | Occurs | |
| Bearberry | | | | | | Occurs |
| Beech, American | | | | | | Occurs |
| Birch, Black | | | Occurs | | Occurs | |
| Birch, Gray | Common | | | Occurs | Occurs | |
| Birch, White | Dominant | | | | | |
| Blueberry, Lowbush | | Occurs | Char. | Occurs | Occurs | Dominant |
| Bluestem, Little | | | | | | Occurs |
| Bracken (fern) | | Occurs | | Occurs | | Occurs |
| Bush-clover | | | | | | Occurs |
| Cedar, Eastern Red | | Occurs | | | | |
| Cherry, Black | Dominant | | | Occurs | | Occurs |
| Cherry, Pin | Common | | | | | |
| Chestnut, American | | | Occurs | | Occurs | |
| Corydalis, Pale | | | | | Occurs | |
| Dogwood, Flowering | | | Occurs | Occurs | | |
| Dogwood, Gray | | | Char. | | | |
| Foxglove, Downy False | | Occurs | | | | |
| Foxglove, Fern-leaf False | | Occurs | | | | |
| Foxglove, Smooth False | | Occurs | | | | |
| Grass, Poverty | | | | | Occurs | |
| Gum, Black | | | | | | Occurs |
| Hazelnut, American | | | Char. | Occurs | | |
| Hazelnut, Beaked | | | Char. | | | |
| Hemlock, Eastern | | Occurs | | | | |
| Hepatica | | | Occurs | | | |
| Hickory, Mockernut | | | Occurs | | | |
| Hickory, Pignut | | Occurs | Occurs | | | |
| Hickory, Shagbark | | Occurs | Occurs | | | |
| Hickory, Sweet Pignut | | | Occurs | | | |
| Holly, American | | | | | | Occurs |
| Hop-hornbeam | | | Occurs | | | |
| Huckleberry, Black | | Occurs | | Occurs | Occurs | Dominant |
| Lady's Slipper, Pink | | | | Occurs | | |
| Laurel, Mountain | | Occurs | | | Occurs | |
| Maple, Red | Dominant | Occurs | Occurs | Occurs | Occurs | Occurs |
| Milkwort | | | | | | Occurs |
| New Jersey Tea | | | Char. | | | |

Plants Associated with Deciduous Forest/Woodland Communities
Part 2. Communities without sugar maple (continued)

| | Successional Northern Hardwoods | Ridgetop Chestnut Oak | Oak - Hickory | Black Oak – Scarlet Oak | Mixed Oak | Coastal Forest/ Woodland |
|-----------------------|---------------------------------------|--------------------------|---------------|----------------------------|--------------|-----------------------------|
| Oak, Black | | Occurs | Dominant | Dominant | Dominant | Dominant |
| Oak, Chestnut | | Dominant | | | Dominant | Dominant |
| Oak, Dwarf Chinquapin | | Occurs | | | | |
| Oak, Northern Red | | Occurs | Dominant | | Dominant | |
| Oak, Post | | | | | | Occurs |
| Oak, Scarlet | | Occurs | Dominant | Dominant | Dominant | Dominant |
| Oak, Scrub | | Occurs | | Occurs | Occurs | |
| Oak, Swamp White | | | | | | |
| Oak, White | | Occurs | Dominant | Occurs | Dominant | Dominant |
| Pepper-bush, Sweet | | | | | | Occurs |
| Pine, Pitch | | Occurs | | | | Occurs |
| Pine, White | | Occurs | | | | Occurs |
| Pinweed | | | | | Occurs | |
| Rattlesnake Weed | | | Occurs | | | |
| Rockrose, Canadian | | | | | | Occurs |
| Sarsaparilla, Wild | | | Occurs | | Occurs | Occurs |
| Sassafras | | | Occurs | Occurs | | Occurs |
| Sedge | | Occurs | | Occurs | | |
| Sedge, Pennsylvania | | | Occurs | Occurs | Occurs | Occurs |
| Shadbush | | | Occurs | Occurs | | |
| Silverrod | | | Occurs | | | |
| Solomon's Seal, False | | | Occurs | | | |
| Sweet Fern | | | | | Occurs | |
| Tick-trefoil | | | Occurs | | | |
| Viburnum, Maple-leaf | | | Char. | Occurs | | |
| Wintergreen | | Occurs | | | | Occurs |
| Witch-Hazel | | | Occurs | | | |

Char. = Characteristic

NOTE: This is not an exhaustive list of plant species that occur in these communities. Rather, it is a list of species associated with these communities as identified in Swain and Kearsley (2001.)

Hierarchical classification of natural communities within the Terrestrial System

| Sub-System | Community Group | Community Sub-group | Community Type |
|------------|--------------------------|---------------------------|--|
| Open | Rock Substrate | Summits and Rock Outcrops | Riverside Rock Outcrop Serpentine Outcrop Acidic Rocky Summit/Rock Outcrop Calcareous Rocky Summit/Rock Outcrop Circumneutral Rocky Summit/Rock Outcrop |
| | | Rock Cliff | Maritime Rock Cliff Calcareous Rock Cliff Acidic Rock Cliff Circumneutral Rock Cliff |
| | Unconsolidated Substrate | N/A | Maritime Erosional Cliff Maritime Beach Strand Maritime Dune |
| ----- | | | |
| Herbaceous | N/A | N/A | Sandplain Grassland Cultural Grassland Dry Riverside Bluff |
| ----- | | | |
| Shrub | N/A | N/A | Sandplain Heathland Maritime Shrubland Maritime Pitch Pine on Dunes Maritime Juniper Woodland/Shrubland Scrub Oak Shrubland Pitch Pine-Scrub Oak Ridgetop Pitch Pine-Scrub Oak |

Hierarchical classification of natural communities within the Terrestrial System (continued)

| Sub-System | Community Group | Community Sub-group | Community Type |
|------------------------|--|---------------------|---|
| Forest/Woodland | Talus Forest/Woodland | N/A | <ul style="list-style-type: none"> Circumneutral Talus Forest/Woodland Calcareous Talus Forest/Woodland Acidic Talus Forest/Woodland |
| | Conifer Forest/Woodland | N/A | <ul style="list-style-type: none"> Hemlock Ravine Successional White Pine High Elevation Spruce – Fir Forest |
| | Mixed Coniferous-Deciduous Forest/Woodland | N/A | <ul style="list-style-type: none"> Spruce – Fir Northern Hardwood Forest Oak – Hemlock – White Pine Forest Northern Hardwoods – Hemlock – White Pine White Pine – Oak Forest Maritime Juniper Woodland/Shrubland Pitch Pine – Oak Forest Maritime Oak-Holly Forest/Woodland Coastal Forest/Woodland |
| | Deciduous Forest/Woodland | N/A | <ul style="list-style-type: none"> Calcareous Forest Seep Forest Seep Yellow Oak Dry Calcareous Forest Hickory – Hop-hornbeam Forest/Woodland Red Oak – Sugar Maple Transition Forest Rich, Mesic Forest Dry, Rich Acidic Oak Forest Successional Northern Hardwoods Forest Ridgetop Chestnut Oak Forest/Woodland Oak – Hickory Forest Black Oak – Scarlet Oak Forest/Woodland Mixed Oak Forest |

