A Guide to the Natural Communities of Massachusetts

2021 Edition

INSIDE COVER

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 (MNHESP) *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 described natural communities, it provides no keys to assist in their identification. 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. Manomet's initial guide was expanded to include all of eastern Massachusetts, and in 2005 the guide was again expanded to include all of Massachusetts. (Excerpted from *The Guide to the Natural Communities of Massachusetts*, 2006)

The Southeastern Massachusetts Pine Barrens Alliance (SEMPBA) discovered *A Guide to the Natural Communities of Massachusetts* in 2013, while searching for a method for identifying and mapping natural communities that volunteers and land managers could utilize for land management and planning with little training. With the assistance of our friends at the MNHESP, we updated the guide to align with MNHESP's current classification system revised in 2018. We incorporated GPS and smart phone technology and Google mapping tools, and created an online version of the MNHESP Field Form 2. We also created an online plant field guide for each of the natural communities. SEMPBA now offers training in natural community identification and mapping. We also provide support for data collection and reporting to promote regional conservation planning and encourage the restoration of wildlife habitat. (SEMPBA 2017)

Acknowledgements

The initial version of this guide was developed through a grant from the Massachusetts Environmental Trust's Ecosystem Health and Biological Diversity Program. Additional support was provided by Manomet's Senior Scientist Support fund. This guide builds upon the work of others. We thank the MNHESP, 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 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. 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. (Excerpted from *The Guide to the Natural Communities of Massachusetts*, 2006)

SEMPBA wishes to thank Manomet for developing the training materials and Paul M. Cavanagh, formerly of Manomet, for pointing us to the Guide and training slides, which were languishing in the public domain. We want to thank Tim Simmons, former ecologist with the MNHESP, for his thoughtful advice and hours of editing and critiquing the revisions of this guide and those at MHNESP who reviewed these materials and offered their assistance, namely, Jonathan Regosin, Lynn Harper and Chris Buelow. We are especially grateful to SEMPBA volunteer Daniele Collitti, and SEMPBA's MassLIFT AmeriCorps Member Jack Jezard, both of whom spent hundreds of hours revising this guide and adding the supporting materials. Special thanks to Irina Kadis and Alexey Zinovjev for allowing us to use photos from their online plant gallery at salicicola.com. To an anonymous donor and the New England Grassroots Environment Fund, we thank you for providing support to SEMPBA for this project.

SEMPBA acknowledges and thanks the organizations below for their various roles in reviving and supporting this project. Any errors or omissions are solely the responsibility of SEMPBA.

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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 classification system (i.e., 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. We are only beginning to obtain this knowledge.

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 is 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. It is 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. Observations of rare natural communities (i.e., those with a rank of S1-S3; see Page 4 for details) should be reported to the MNHESP.

Natural Heritage & Endangered Species Program
Massachusetts Division of Fisheries & Wildlife
North Drive, Westborough, MA 01581
2006

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 MNHESP 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 it becomes 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 129.)* 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 rarest 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 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.

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.

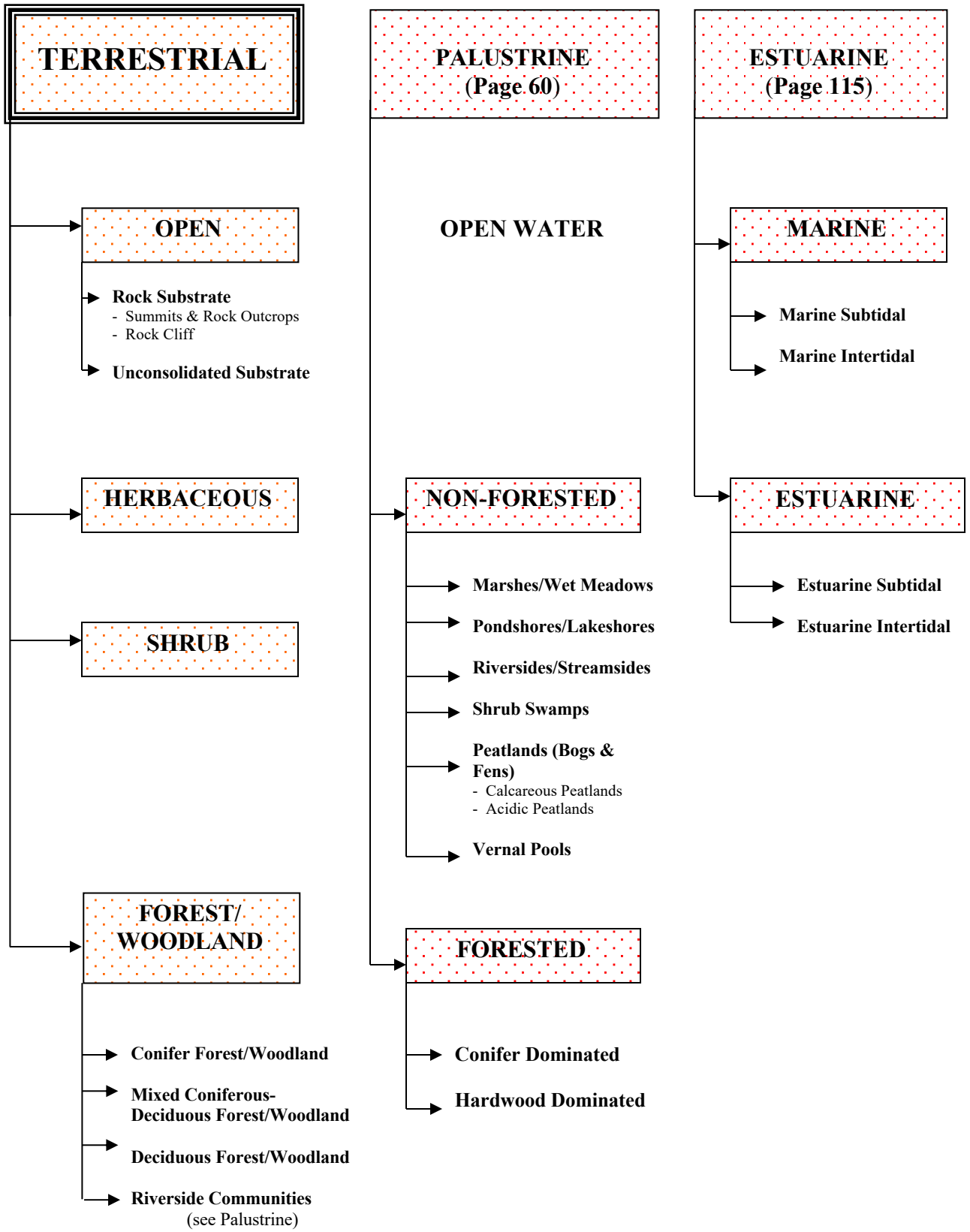
S4 – Apparently secure in Mass.

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.

A list of natural communities, by State Rank, begins on page 147.

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 Mass Wildlife 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.


TERRESTRIAL
PALUSTRINE
(Page 60)
ESTUARINE
(Page 115)
OPEN
Rock Substrate
- Summits & Rock Outcrops
- Rock Cliff
Unconsolidated Substrate
HERBACEOUS
SHRUB
FOREST/
WOODLAND
Conifer Forest/Woodland
Mixed Coniferous-
Deciduous Forest/Woodland
Deciduous Forest/Woodland
Riverside Communities
(see Palustrine)
OPEN WATER
NON-FORESTED
Marshes/Wet Meadows
Pondshores/Lakeshores
Riversides/Streamsides
Shrub Swamps
Peatlands (Bogs &
Fens)
- Calcareous Peatlands
- Acidic Peatlands
Vernal Pools
FORESTED
Conifer Dominated
Hardwood Dominated
MARINE
Marine Subtidal
Marine Intertidal
ESTUARINE
Estuarine Subtidal
Estuarine Intertidal

OPEN

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

ROCK SUBSTRATE

SUMMITS & ROCK OUTCROPS (Mostly horizontal) **Page 10**
Riverside Rock Outcrop
Acidic Rocky Summit/Rock Outcrop
Calcareous Rocky Summit/Outcrop
Circumneutral Rocky Summit/Rock Outcrop
Open Talus/Coarse Boulder

ROCK CLIFF (Vertical) **Page 16**
Maritime Rock Cliff
Calcareous Rock Cliff
Acidic Rock Cliff
Circumneutral Rock Cliff

UNCONSOLIDATED SUBSTRATE
(Page 20)

Maritime Erosional Cliff
Maritime Beach Strand
Maritime Dune

HERBACEOUS

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

(Page 22)

Sandplain Grassland
Cultural Grassland
Sandplain Grassland – Inland Variant

SHRUB

(< 25% TREE CANOPY)

(Page 24)

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

FOREST/WOODLAND

(> 25% TREE CANOPY)

CONIFER FOREST/WOODLAND
(Canopy >= 75% conifers; **Page 31**)

Hemlock Forest
Successional White Pine Forest
High Elevation Spruce-Fir Forest/Woodland

MIXED CONIFEROUS-DECIDUOUS FOREST/WOODLAND
(Canopy >= 25% conifers and >= 25% deciduous; **Page 34**)

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

FOREST/WOODLAND (CONTINUED)

(> 25% TREE CANOPY)

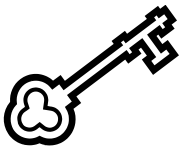
DECIDUOUS FOREST/WOODLAND
(Canopy >= 75% deciduous; **Page 43**)

Forest Seep
Yellow Oak Dry Calcareous Forest
Hickory – Hop Hornbeam Forest/Woodland
Red Oak – Sugar Maple Transition Forest
Rich, Mesic Forest
Dry, Rich Oak Forest/Woodland
Successional Northern Hardwood Forest
Oak – Hickory Forest
Black Oak – Scarlet Oak Woodland
Coastal Forest/Woodland
Mixed Oak Forest/Woodland
Sugar Maple – Oak – Hickory Forest
Open Oak Forest/Woodland
Oak – Tulip Tree Forest
Chestnut Oak Forest/Woodland

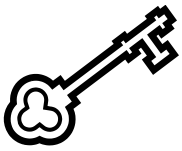
RIVERSIDE COMMUNITIES

(See Palustrine System for Floodplain Forests)

SUMMIT AND ROCK OUTCROP COMMUNITIES
(Mostly Horizontal)



Shortcut Key: Check full descriptions following use

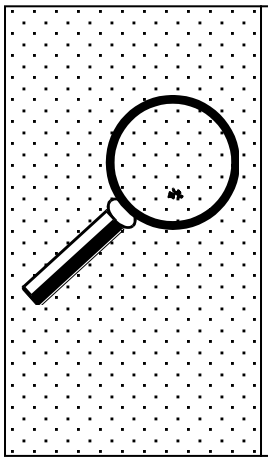


1. Community on outcrop located along river, and showing signs of flood scouring.
   - A. Yes – Riverside Rock Outcrop
   - B. No – Go to 2

2. Community on 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 3

3. 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 – Go to 4

4. Community on rocky summits, ridges, and rocky outcrops near Hickory - Hop Hornbeam Forest with circumneutral substrates (conglomerate, basalt, etc.)
   - A. Yes – Circumneutral Rocky Summit/Rock Outcrop
   - B. No – Open Talus/Coarse Boulder



These communities can be surprisingly difficult to identify.

Identification to community type may require knowledge of geology. 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 and ice 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; running serviceberry; New York Aster or smooth (a.k.a. riverside) rose.
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. White pine; pitch pine; and red oak commonly found near the bedrock areas. Pitch Pine – Scrub Oak communities and other ridgetop communities often found around open patches.
Sub-canopy	
Shrub layer	Low and discontinuous. Dominant shrubs include: scrub oak; huckleberry; early sweet blueberry; low sweet blueberry; 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 hair grass; Pennsylvania sedge; and cow wheat.
Leaf litter	

Calcareous Rocky Summit/Rock Outcrop S2

Description/Concept	Open community of shrubs and herbaceous plants on calcareous ridge tops or mid-slope ledges. *RIDGE TOP* - support relatively sparse herbaceous vegetation. *OUTCROP* - tend to be moister and lightly shaded.
Topography	Generally outcrops/ledges, but can be found on ridgetop areas.
Soils/Substrate	Exposed calcareous bedrock or outcrops/ledges.
Canopy	*RIDGE TOP* - trees uproot and pull away from ridge, keeping community open. *OUTCROP* – adjacent trees characteristic of Rich Mesic Forest, including sugar maple, white ash, and hop-hornbeam.
Sub-canopy	
Shrub layer	*RIDGE TOP* – round-leaved dogwood, round-leaved shadbush as well as less common northern prickly rose, hairy honeysuckle, and downy arrow-wood. *OUTCROP* – no shrub layer described.
Herb layer	*RIDGE TOP* – ivory sedge, purple clematis, long-leaved bluet, balsam-ragwort, and lyre-leaved rock-cress. *OUTCROP* – 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	SE/SW facing slopes; open ridge tops; steep 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 and bearberry may be present and found throughout. Hackberry is less common and is usually restricted to the edge of the openings.
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 leaved violet; small-flowered bittercress; skunk meadow-rue; strawberry; dwarf dandelion, pink corydalis; sleepy catch fly; Venus' looking glass; blue curls; goldenrods; and grasses.
Leaf litter	

Open Talus/Coarse Boulder S2

Description/Concept	Sparsely vegetated community usually below cliffs or rock outcrops or in boulder fields left by glaciers. May be replaced lower on the slope if tree canopy cover is greater than 25%.
Topography	Usually below cliffs or rock outcrops.
Soils/Substrate	Shallow soils or moist loamy deciduous litter in crevices between boulders
Canopy	Little to none.
Sub-canopy	
Shrub layer	
Herb layer	Lichens often cover exposed rocks and boulders. Sparse pockets of rock polypody, Virginia creeper, poison ivy and occasionally fringed bindweed are sometimes present. Clematis, climbing fumitory, Marginal wood fern and pink corydalis may also be present, and raspberries and grape vines can sometimes be abundant.
Leaf litter	

Plants Associated with Summit and Rock Outcrop Communities

	Riverside Rock Outcrop	Acidic Summit/Rock Outcrop	Calcareous Summit/Rock Outcrop	Circumneutral Rocky Summit/Rock Outcrop	Open Talus/Coarse Boulder
Arrow-wood, Downy			Occurs		
Ash, White			Occurs	Occurs	
Bearberry				Occurs	
Birch					
Bittercress, Dry land				Occurs	
Blueberry, Lowbush		Dominant			
Bluestem, Big	Typical				
Bluestem, Little		Occurs		Occurs	
Bluet, Long-leaved			Occurs		
Bracken (fern)					
Burnet, Canadian	Typical				
Cedar, Eastern Red				Occurs	
Chokeberry, Black		Dominant			
Clematis, Purple			Occurs		Occurs
Cliff-fern, Rusty				Occurs	
Columbine			Occurs		
Corydalis, Pale				Occurs	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	
Grass, Poverty		Occurs		Occurs	
Groundsel, Balsam			Occurs		
Hackberry				Occurs	
Hairgrass, Common		Occurs			
Harebell	Typical		Occurs		
Hemlock, Eastern					
Hickory, Shagbark				Occurs	
Hickory, Sweet Pignut				Occurs	
Honeysuckle, Hairy			Occurs		
Hop-hornbeam			Occurs		
Huckleberry, Black		Dominant			
Maple, Red					
Maple, Sugar			Occurs		
Meadow-rue, Skunk				Occurs	
Oak, Dwarf Chestnut		Uncommon			
Oak, Northern Red		Common			
Oak, Scrub		Dominant			
Pine, Pitch		Common			
Pine, Red		Common			
Pine, White		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)

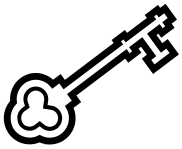
	Riverside Rock Outcrop	Acidic Summit/Rock Outcrop	Calcareous Summit/Rock Outcrop	Circumneutral Summit/Rock Outcrop	Open Talus/Coarse Boulder
Sandwort, Large-leaved					
Saxifrage, Early			Occurs	Occurs	
Sedge, Ivory			Occurs		
Sedge, Parasol				Occurs	
Sedge, Peduncled			Occurs		
Sedge, Pennsylvania		Occurs	Occurs	Occurs	
Serviceberry, Dwarf		Occurs			
Shadbush, Roundleaf			Occurs		
Sleepy Catchfly				Occurs	
Spikemoss, Rock				Occurs	
Spleenwort, Ebony			Occurs		
Spleenwort, Maidenhair			Occurs		
Strawberry				Occurs	
Venus' Looking Glass				Occurs	
Violet, Arrow-leaf				Occurs	
Witch hazel					
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.)

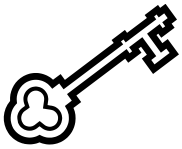
Known Distribution of Summit and Rock Outcrop Communities

Community Type	Berkshires	Connecticut Valley	Worcester Plateau	Eastern Mass.	Cape & Islands
Riverside Rock Outcrop	X	X		Probable	
Acidic Rocky Summit/Rock Outcrop	X		X	X	
Calcareous Rocky Summit/Rock Outcrop	X				
Circumneutral Rocky Summit/Rock Outcrop		X	X	X	
Open Talus/Coarse Boulder			X	X	

ROCK CLIFF COMMUNITIES (VERTICAL)

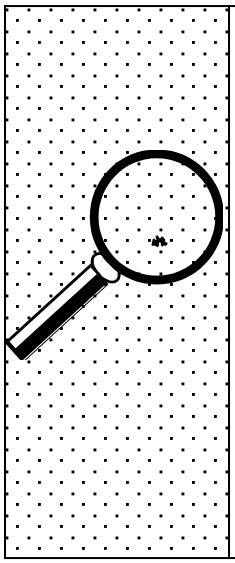


Shortcut Key: Check full descriptions following use of key



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 and coastal bedrock outcrops.
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, seaside goldenrod, Scotch lovage, common hairgrass, and red fescues.
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 ***plant association not distinctive.***
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, bearberry, 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 on rock face. 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, typically Red Cedar
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: pink corydalis, bearberry, plantain-leaved pussytoes, columbine, marginal wood-fern, little bluestem grass, ebony spleenwort, Rusty cliff-fern, and mosses.
Leaf litter	

Known Distribution of Rock Cliff Communities

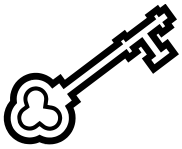
Community Type	Berkshires	Connecticut Valley	Worcester Plateau	Eastern Mass.	Cape & Islands
Acidic Rock Cliff	X		X		
Circumneutral Rock Cliff	X	X			
Maritime Rock Cliff				X	
Calcareous Rock Cliff	X	X			

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



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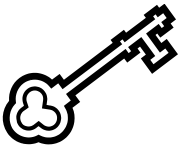
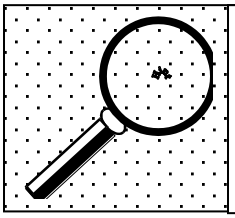


1. Coastal Community on a vertical or near vertical cliff being actively eroded by the sea.	A. Yes – Maritime Erosional Cliff B. No – Go to 2
2. Community located between fore dunes and wrack line.	A. Yes – Maritime Beach Strand B. No – Go to 3
3. Community on sand dunes with patches of herbaceous plants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

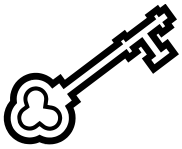
Maritime Beach Strand S3

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 is primary substrate, but also includes cobble.
Canopy	
Sub-canopy	
Shrub layer	
Herb layer	Sea-rocket, dunegrass, beach pea, seabeach orache, seabeach sandwort, seaside-flatsedge, seabeach saltwort, seaside goldenrod.
Leaf litter	

Maritime Dune S3

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 blueberry, sweet fern, beach plum.
Herb layer	Dunegrass, seaside goldenrod, beach pea, beach heather, poison ivy. Salt hay, common hairgrass, little blue stem, and poverty grass are common. Beach Pinweed and jointweed grow with heathers.
Leaf litter	

HERBACEOUS COMMUNITIES



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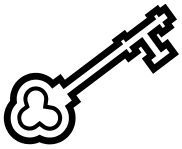
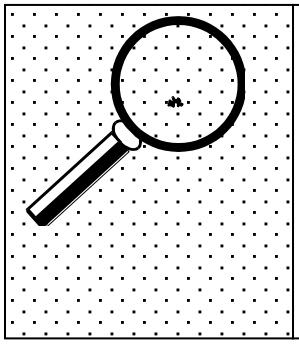


1. Community dominated by grasses, but includes some shrubs. Oftentimes semi-natural. Surrounded by Pitch Pine – Scrub Oak communities oftentimes	A. Yes – Sandplain Grasslands Inland Variant B. No – Go to 2
2. Community dominated by grasses, but with forbs and shrubs, on flat outwash plain with droughty 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]



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.

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.

a. 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, stiff aster, bayberry, lowbush blueberry, a variety of goldenrods, and black huckleberry.
Herb layer	**Goat's rue, colic-root, 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 SNR

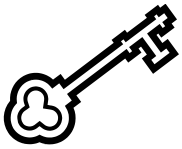
Description/Concept	Human created and maintained community. Dominated by grasses. Includes pastures, hayfields, abandoned fields, airports, cemeteries, recreation fields, and utility rights of way.
Topography	
Soils/Substrate	Sand, or other droughty low nutrient soils.
Canopy	
Sub-canopy	
Shrub layer	
Herb layer	Dominated by timothy, orchard grass, smooth brome, and redtop
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.)]

Sandplain Grassland – Inland Variant S2

Description/Concept	Oftentimes semi-natural open community visually dominated by native grasses on sandplains or gravel. Usually need management to remain tree-less in absence of fire. Often found in inland airports, military lands and wildlife management areas on sandplains
Topography	Open, cleared land.
Soils/Substrate	Sandplains or gravel.
Canopy	Often surrounded by Pitch Pine – Scrub Oak communities. If left unmanaged they will succeed to forest.
Sub-canopy	
Shrub layer	Occasionally sweet fern or dewberries forms large patches
Herb layer	Dominated by little bluestem, Pennsylvania Sedge and poverty grass. Also includes a mix of goldenrods, milkweeds, butterfly weed and occasionally New England Blazing Star.
Leaf litter	

SHRUB COMMUNITIES



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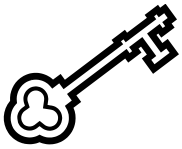
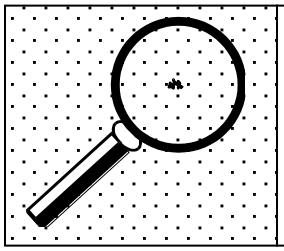


1. Pitch pine common or dominant.	A. Yes – Go to 2 B. No – Go to 6
2. Scrub oak common or dominant.	A. Yes – Go to 3 B. No – Go to 4
3. Pitch pine-scrub oak community located on ridge, steep slope, or rocky outcrop.	A. Yes – Ridgetop Pitch Pine – Scrub Oak B. No – Pitch Pine – Scrub Oak
4. Scattered pitch pine on <u>active</u> sand dune.	A. Yes – Maritime Pitch Pine Woodland on Dunes B. No – Go to 5
5. Area within <u>direct</u> 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 – Go to 8
8. Community is semi-natural and found inland	A. Yes – Sandplain Heathland – Inland Variant B. No – Go to 9
9. Community is shrub dominated, coastal and often occurs within openings of Maritime Shrubland, Pitch Pine – Scrub Oak and Scrub Oak communities.	A. Yes – Sandplain Heathland B. No – Go to 10
10. Community is shrub dominated (oftentimes by blueberries) and is found on ridgetops and summits.	A. Yes – Ridgetop 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 Woodland on Dunes
Beyond Reach of Salt Spray	Sandplain Heathland (possible)
	Scrub Oak Shrubland
	Pitch Pine – Scrub Oak
	Sandplain Heathland – Inland Variant
Ridgetops, Steep Slopes, or Rocky Outcrops	Ridgetop Pitch Pine–Scrub Oak
	Ridgetop Heathland

Descriptions of Shrub Communities

Ridgetop Heathland **S2**

Description/Concept	A natural or semi-natural low shrub community on bedrock.
Topography	Hills, ridgetops and rock outcrops sometimes just below Acidic or Circumneutral Rocky Summits/Rock Outcrops.
Soils/Substrate	Droughty, low nutrient soils or bedrock.
Canopy	Either completely absent or poorly developed White pine, gray or white birch and red maple may be present from surrounding forests.
Sub-canopy	
Shrub layer	Nearly continuous layer of low-growing shrubs sometimes derived from abandoned blueberry or grazed sites. Low sweet blueberry dominates. Early sweet blueberry, black huckleberry, bearberry, sheep-laurel, black chokeberry and mountain-laurel.
Herb layer	Little bluestem, poverty grass and hairgrass are typical, but sparse. Three-toothed cinquefoil is characteristic of the northern extents of the community.
Leaf litter	

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, broom crowberry, 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.** Uncommon plants in Massachusetts include sandplain flax, sandplain blue-eyed grass, eastern silvery aster, purple cudweed, butterfly weed and broom crowberry
Leaf litter	

Sandplain Heathland – Inland Variant S2

Description/Concept	Often semi-natural, usually successional low shrub community on sandplains or gravel in interior parts of the state. Usually needs management to remain open in the absence of fire. Often in the openings of Pitch Pine – Scrub Oak communities
Topography	Usually away from the coast on glacial lake beaches and dry riverside play
Soils/Substrate	Sand or gravel sediment deposits
Canopy	Nearly treeless
Sub-canopy	
Shrub layer	Low sweet blueberry, early sweet blueberry and/or black huckleberry. Scrub oak, American hazelnut, bearberry, sweet fern, New Jersey Tea and/or sheep laurel also common. Also includes tree saplings from surrounding forest including pitch or white pine, gray or white birch, trembling aspen or red maple
Herb layer	Little bluestem, poverty grass and hairgrass are typical, but goat's rue, stiff aster, woodland sunflower and wild lupine are common between shrub patches.
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 and within the area of direct influence of the ocean and salt spray.
Topography	On barrier beach dunes, bluffs, rocky headlands or next to tidal marshes
Soils/Substrate	Rocky headlands, sand dunes.
Canopy	
Sub-canopy	
Shrub layer	Huckleberry, bayberry, and red cedar areas often distinctive. Black cherry, beach-plum, chokeberry, low bush 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 Woodland on Dunes S1

Description/Concept	Scattered pitch pine on sand dunes, with trunks at least partially buried. Open canopy with bare ground, scattered shrubs, herbaceous plants, and patches of lichens. Just beyond the influence of the daily 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, various 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. Green briar can be abundant in in more established woodlands, especially along open edges
Herb layer	Highly variable. Little bluestem, dunegrass, and sedges often with scattered beach heather or Seabeach sandwort.
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 S2

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	Usually occur on sandplains
Soils/Substrate	Sand or shallow soils on bedrock
Canopy	Sparse amounts of pitch pine, red or black oak, gray birch and quaking aspen.
Sub-canopy	
Shrub layer	Shrub oaks (bear, and dwarf chinquapin oak) dominate and form almost impenetrable thickets usually 1m (2-3ft) to greater than 2m (6ft) in height. Black huckleberry, low bush blueberry, early sweet blueberry, black chokeberry, sheep laurel and sweet fern are characteristic.
Herb layer	Pennsylvania sedge, little bluestem, poverty grass, cow wheat, bracken fern, bearberry and areas of lichens are also characteristic.
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, acidic, low nutrient soils; usually deep, coarse, well drained sands of glacial origin.
Canopy	**Pitch pine forms open canopy (10% to about 25%)** over shrub oaks (usually scrub oak, but also dwarf chinquapin oak) Inland variants may have gray birch, trembling aspen, black cherry, or fire cherry. In areas with >40% canopy cover the community is considered a forest instead of shrubland.
Sub-canopy	
Shrub layer	Scrub oak is between 2-4 meters (7-15ft), may be impenetrable or open and shorter huckleberry occurs between the oaks. Lowbush blueberries and bearberry complete the shrub layer
Herb layer	Sedges and little bluestem are common in openings of taller shrubs. Golden heather, cow wheat and mayflower are also present.
Leaf litter	Lichens are interspersed within the shrub layer.

[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, often in a mosaic with Rocky Summit/Rock Outcrop Communities. 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 (average of 5m tall). Scattered taller trees include red, black, scarlet, and rock chestnut-oak, gray birch, black cherry and red maple. White pine may dominate in areas not exposed to fire.
Sub-canopy	
Shrub layer	Patchy and often interspersed with large areas of exposed bedrock. Scrub oak is the most characteristic species of the community. Dwarf chinquapin oak, mountain laurel, wild raisin, red chokeberry and serviceberries occur in lower abundance.
Herb layer	Extremely sparse and tends to occur in rock crevices and at tree bases. May include Canada mayflower, starflower, hairgrass, goldenrods, wintergreen and sedges.
Leaf litter	May consist of areas of Lichen covered or exposed 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.]

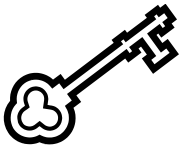
Plants Associated with Shrub Communities

	Sandplain Heathland	Maritime Shrubland	Maritime Pitch Pine on Dunes	Maritime Juniper	Scrub Oak Shrubland	Pitch Pine - Scrub Oak	Ridgetop Pitch Pine – Scrub Oak	Ridgetop Heathland
Aster, Stiff	Char.							
Bayberry	Char.	Dominant		Occurs				
Beachgrass, American				Occurs				
Bearberry	Dominant	Occurs	Char.			Occurs		Occurs
Birch, Gray							Occurs	
Blueberry, Lowbush	Dominant	Occurs			Char.	Occurs	Occurs	Dominant
Bluestem, Little	Char.			Occurs	Char.	Occurs		Occurs
Catbrier		Occurs						
Cedar, Eastern Red		Dominant		Dominant				
Cherry, Black		Occurs		Occurs				
Chokeberry, Black	Char.							Occurs
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	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	

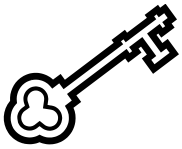
Char. = Characteristic

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.)

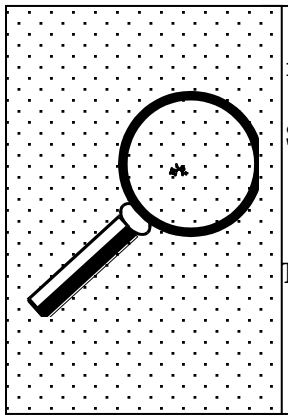
CONIFER FOREST/WOODLAND COMMUNITIES



Shortcut Key: Check full descriptions following use of keys



1. Hemlock dominated community with 80-100% canopy closure.	A. Yes - Hemlock Forest B. No – Go to 2
2. Balsam fir dominated community located at high elevation.	A. Yes – High Elevation Spruce – Fir Forest/Woodland B. No – Go to 3
3. White pine dominated community.	A. Yes – Successional White Pine Forest



Successional White Pine communities are more variable than indicated in the community description. By default, ***any*** conifer forest dominated by white pine must be classified as Successional White Pine. However, pure stands of mature white pine likely represent past human activities and are, therefore, a cultural community

Timber stands dominated by conifers not listed in the key cannot be identified to community under the State's classification system as they are cultural, not natural, communities. [a]

a. [Decision Rules permit the classification of stands of conifers. If the canopy is >75% conifers, and the boundaries of the stand are geometrically regular or the trees are in rows, the stand may be classified as a plantation (PLT.)]

Descriptions of Conifer Forest/Woodland Communities

Hemlock Forest S4

Description/Concept	A hemlock dominated community with 80-100% closure. Little understory. Dense canopy with at least 50% cover of eastern Hemlock is the key characteristic.1 Usually occurs as community within oak-hemlock-white pine community.
Topography	Usually on north or northwest-facing slopes or ravines.
Soils/Substrate	Acidic and nutrient-poor soils with a thick, poorly decomposed duff layer.
Canopy	Eastern hemlock dominated. Other species at low percentages include red, scarlet, white, and black oaks, red spruce, white pine. American beech, yellow or black birch and red maple.
Sub-canopy	
Shrub layer	Sparse. Occasional individuals of canopy species, small patches of mountain laurel, witch hazel, striped maple and hobblebush growing in the gaps in the canopy.
Herb layer	Essentially non-existent, but in the small openings Canada Mayflower, starflower, wild sarsaparilla, rock polypody, hay-scented fern, intermediate wood fern, mountain wood fern or shining fir-moss.
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	Near monoculture of white pine, with scattered white oak, northern red oak, red maple, birches and aspens.
Sub-canopy	
Shrub layer	Variable density, from sparse to thick. Includes black elderberry, black cherry, and maple-leaved viburnum. Often includes non-native species such as glossy alder-buckthorn, multiflora rose, and/or bush honeysuckle. Lowbush blueberry forms patches mixed with black huckleberry on less disturbed sites. Bracken fern may occur.
Herb layer	“Thin” or variable. Canada mayflower, starflower, and clubmosses, southern ground-cedar, and staghorn clubmoss are common on formerly plowed soil. Partridgeberry, fringed polygala, and pink lady’s slipper grow in long established sites.
Leaf litter	Forest floor carpeted with needles. Blackberry vines and poison ivy often cover ground near openings in formerly open, disturbed areas.

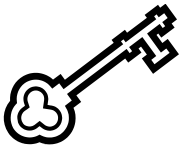
[Decision Rule: WP s category = >75% white pine.]

High Elevation Spruce – Fir Forest/Woodland S1

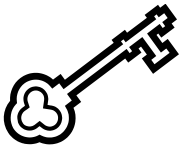
Description/Concept	Forest/woodland of trees dwarfed by winds on the exposed ridgelines of Mount Greylock and its massif Only occurs above 915m (3000ft) Plants only grow to be 5-10m (15-33ft)
Topography	Exposed ridgelines on the tallest mountains in Massachusetts
Soils/Substrate	Thin, acidic and nutrient poor. Granite, schist or gneiss bedrock.
Canopy	Balsam fir and red spruce are the most dominant and form dense thickets. Canopy cover is usually patchy. Paper birch, heart-leaf paper birch and yellow birch occur in low numbers.
Sub-canopy	
Shrub layer	Where there is light, mountain maple, mountain holly, American mountain-ash, and hobblebush may grow.
Herb layer	Northern stalked sedge, New England sedge, blue-bead lily, mountain wood-sorrel, bunchberry, bristly clubmoss and shining fir-moss exist.
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



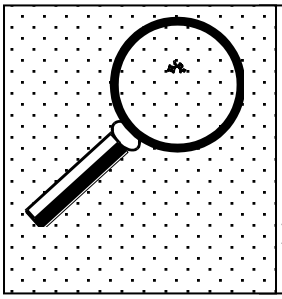
1. Red spruce dominant or co-dominant.	A. Yes – Spruce – Fir Northern Hardwood Forest B. No – Go to 2
2. Hemlock present, may range from scattered to dominant.	A. Yes – Go to 3 B. No – Go to 5
3. Northern hardwoods (e.g., sugar maple, yellow birch, paper birch) present, likely characteristic. Shrub layer 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/Shrubland B. No – Go to 7
7. Pitch pine constitutes 25-75% of canopy.	A. Yes – Pitch Pine – Oak Forest/Woodlands 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 Forest/Woodland 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.



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.

Because of this you must consider where the community is located to arrive at a correct identification.

Locations of Mixed Coniferous-Deciduous Forest/Woodland Communities

Location	Community Type
Within daily salt spray influence	Maritime 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/Woodland
	White Pine – Oak Forest
	Oak – Hemlock – White Pine Forest
	Northern Hardwoods – Hemlock – White Pine Forest
	Spruce – Fir – Northern Hardwoods 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/Woodland
	White Pine – Oak Forest (possible)
Maritime Shrub Layer (e.g., bayberry, winged sumac)	Maritime Forest/Woodland
	Maritime Juniper Woodland/Shrubland
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 Hardwoods Forest

Descriptions of Mixed Coniferous-Deciduous Forest/Woodland Communities

Spruce – Fir – Northern Hardwoods Forest S4

Description/Concept	Mixed red spruce – northern hardwood forest prevalent in the cooler, northern parts of the state.
Topography	Cool areas above ~450m (~1400ft)
Soils/Substrate	Rocky, nutrient poor, dry to mesic, acidic soils
Canopy	Variable dominance of 25-75% conifers, and the inverse of northern hardwoods. Red spruce and/or balsam fir with eastern hemlock may be dominant or co-dominant with sugar maple and American beech, with abundant yellow birch, and smaller amounts of red spruce and/or balsam fir. Heart-leaf paper birch and paper birch usually occur as scattered individuals.
Sub-canopy	
Shrub layer	**Characteristic shrubs include mountain maple, red-berried elderberry, northern mountain-ash, hobblebush, beaked hazel and American yew.** Low shrub layer of bunchberry, creeping snowberry, and occasionally, twinflower.
Herb layer	Sparse, especially when conifers are abundant. Includes intermediate fern, mountain wood fern, bluebead lily, painted Trillium, and wood sorrel.
Leaf litter	Pine needles can be abundant and limit herbaceous growth

[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% hardwooods 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	Normally occurs of south facing, somewhat dry, acidic slopes, commonly on the mid to upper slopes
Soils/Substrate	Somewhat dry, acidic soils
Canopy	Canopy has oaks (red, white, chestnut), black birch, American beech, black cherry, and red maple in association with hemlock and white pine. Relative proportions vary among sites.
Sub-canopy	
Shrub layer	Patchy and sparse. **Witch-hazel, mountain laurel, lowbush blueberry, huckleberry, 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. The matrix forest of higher elevations of western and north-central Massachusetts.
Topography	North facing slopes and ravines (and northern areas).
Soils/Substrate	Neutral to moderately acidic soils with moderate levels of nutrients.
Canopy	Variable combinations of sugar maple, white ash, yellow birch, American beech, black cherry, red oak, bitternut hickory, eastern hemlock and emergent white pine Red maple, paper birch and aspen are often found scattered.
Sub-canopy	Any of the trees present in the canopy as well as hop-hornbeam and striped maple.
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 oats are typical. Occasional spring herbaceous species including: painted Trilliums; early yellow violet, broad-leaved spring beauty; and trout-lily.
Leaf litter	Sugar maple leaf litter is prevalent

[Decision Rules: NHHeWp 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	Slopes or flat to gently rolling moraines, till, or outwash plains below 915m (3000ft)
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, hickory, American beech and sassafras occur regularly in low numbers.
Sub-canopy	
Shrub layer	Chestnut present as shrubby tree. **Usually prominent heath shrub layer**, including lowbush blueberry, black huckleberry, mountain laurel, and sheep laurel. Maple-leaf viburnum and witch-hazel may also be present.
Herb layer	Sparse. Characteristic species include bracken fern, wild sarsaparilla, Canada mayflower, partridge-berry, pink lady's slipper, cow-wheat, and whorled loosestrife.
Leaf litter	Ground-pine, southern ground-cedar, and staghorn clubmoss are particularly apparent in winter.

[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	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, various 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. Green briar can be abundant in in more established woodlands, especially along open edges
Herb layer	Highly variable. Little bluestem, dunegrass, and sedges often with scattered beach heather or Seabeach sandwort.
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.

Pitch Pine – Oak Forest/Woodland S4

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 away from daily oceanic influences (salt spray).
Soils/Substrate	Dry, low nutrient acidic soils of southerly exposures.
Canopy	Pitch pine and tree oaks (black, scarlet, chestnut, and white). White pine and red maple occasionally contribute to the canopy, with these being more prevalent in areas that haven't had a fire in longer times.
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 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 Forest/Woodland S2

Description/Concept	Mixed deciduous/evergreen forest/woodland within salt spray zone. Treetops sculpted by wind and salt. Trees tend to be <10 m (~30ft).
Topography	Exposed bluffs, backs or inland sides of dunes, interdunal areas, and salt marsh borders.
Soils/Substrate	Sands with a surface layer of organic material. Sands may be more acidic and have a higher pH due to accumulation of leaf litter, sea shells and salt spray which can produce conditions too salty for plant life.
Canopy	Trees are often multiple stemmed and contorted from pruning by winds carrying salt and sand, along with being shorter than inland forest. Black oak, scarlet oak, white oak, red maple and hickories are common. American Beech can occasionally be dominant. Basswood, pitch pine and red cedar occur in variable, generally low, amounts.
Sub-canopy	
Shrub layer	American holly, sassafras, black gum, black cherry and red maple are common. Vines, including, greenbrier, poison ivy, Virginia creeper and grape may be dense on the edges of openings. Bayberry, inkberry, winged sumac, shadbush and sweet pepper-bush are present.
Herb layer	Highly variable, includes bracken fern, Canada mayflower, partridge-berry, starflower, Pennsylvania sedge and other sedges and grasses.
Leaf litter	Wetter areas may include columbine, starry Solomon's seal, painted Trillium and skunk meadow-rue.

Coastal Forest/Woodland S4

Description/Concept	Shorter than forests inland, but taller than Maritime Forests (around 10-20m (~30-60ft)). Shrubs and vines are dense near edges. **Away from the daily influence of salt spray, but can receive salt during storms.**
Topography	Occur in protected areas along the coast, behind dunes and on slopes away from the ocean.
Soils/Substrate	
Canopy	Scarlet, black, white, and chestnut oaks are dominant. Post oak important in Buzzards Bay area and on Martha's Vineyard. Red maple, sassafras, black cherry, black gum, American beech, pitch pine, and white pine commonly occur. (Usually low %, but may be abundant.) Red cedar can be scattered and is sometimes is dominant in woodland thickets.
Sub-canopy	American holly is a regular associate in Southeastern Massachusetts.
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. Vines that are abundant on edges include poison ivy, Virginia creeper, grape and greenbriers.
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, MNHESP 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	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						

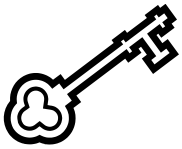
Plants Associated with Mixed Coniferous – Deciduous Forest/Woodland Communities (continued)

	Spruce – Fir Northern Hardwoods	Northern Hardwood - Hemlock - -White Pine	Oak-Hemlock-White Pine	White Pine Oak Forest	Maritime Juniper	Pitch Pine Oak	Maritime	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							

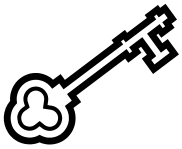
Comm. Pres. = Commonly Present Char. = Characteristic

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

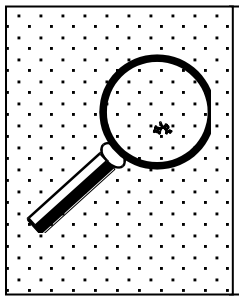


1. Shrub and herbaceous layer typical of wetlands and/or mesic areas. Water flowing or seeping from ground.	A. Yes – Go to 2 B. No – Go to 3
2. Shrub and herb layer characteristic of typical (i.e. not calcareous) wetlands present.	A. Yes – Forest Seep
3. Sugar maple present and/or dominant.	A. Yes – Go to 4 B. No – Go to 8
4. Yellow oak present and/or dominant, site located on shallow rock.	A. Yes – Yellow Oak Dry Calcareous Forest B. No – Go to 5
5. 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 6
6. Northern red oak, American beech, and black birch characterize canopy.	A. Yes – Red Oak – Sugar Maple Transition Forest B. No – Go to 7
7. Elm and/or basswood present and characteristic. Oaks do <u>not</u> dominate canopy.	A. Yes – Rich, Mesic Forest B. No – Dry, Rich Acidic Oak Forest
8. 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 9
9. Hickory present.	A. Yes – Oak – Hickory Forest B. No – Go to 10
10. Black and/or scarlet oak are the <u>only dominant</u> oaks in community.	A. Yes – Black Oak – Scarlet Oak Forest/Woodland B. No – Go to 11

Key continued on next page.

11. Community with variable mix of tree oaks. Located along coast, just out of reach of daily salt spray. American holly present if in Southeastern Massachusetts.	A. Yes – Coastal Forest/Woodland [a] B. No – Go to 12
12. Community with variable mix of tree oaks, but outside of reach of daily salt spray. Found on acidic or talus slopes, with possible dense patches of huckleberry and mountain laurel.	A. Yes – Mixed Oak Forest/Woodland B. No – Go to 13
13. Community dominated by sugar maple and red oak, found on southeast and southwest facing slopes. Woodland-sedge is also present.	A. Yes – Sugar Maple – Oak – Hickory Forest B. No – Go to 14
14. Open and savanna like, with very low, short forest coverage (~37% to 60%). Dominated by red oak.	A. Yes – Open Oak Forest/Woodland B. No – Go to 15
15. Dominated by red oak, but also contains multiple mature tulip trees are present.	A. Yes – Oak – Tulip Tree Forest B. No – Chestnut Oak Forest/Woodland

a. Swain and Kearsley (2001) consider this community type to be in the Mixed Coniferous-Deciduous Forest/Woodland community group. However, examples of this community in Southeastern Massachusetts can lack a coniferous component. Therefore, we have included this community in both keys.



Most of these communities may be thought of as occurring in two groups, those with sugar maple dominant, and those without. (This is reflected in question 4 of the key.)

Some communities may be so similar in canopy that you will need to look for a combination of characteristic herb layer species to confirm community identification (e.g., Rich Mesic Forest versus Dry, Rich Acidic Oak Forest.)

Descriptions of Deciduous Forest/Woodland Communities

Forest Seep S4

Description/Concept	Small pockets of wetlands in forests on slopes, with small springs and seeps on mucky soils. Canopy similar to surrounding forest.
Topography	Slope.
Soils/Substrate	
Canopy	Can contain trees found in all types of forest because Forest Seeps can be found throughout the state. Northern hardwoods, conifers, oak or mixed groups of species can be found. Most trees that provide cover are rooted in the communities surrounding the seep.
Sub-canopy	
Shrub layer	Variable. Can be either dense or barely present and can also contain mixed wetland and upland plants. Typical (depending on location) plants are highbush blueberry, mountain laurel, hobble-bush, swamp dewberry, silky dogwood, winterberry, and, in coastal areas sweet pepperbush.
Herb layer	Dense, with species dependent on location. Golden saxifrage is characteristic of seeps. Jewelweeds, golden ragwort and crooked-stemmed aster are typical, but not restricted to seeps. Scouring rush, water avens, eastern rough sedge, bladder sedge, three-seeded sedge, cinnamon fern, ostrich fern, silvery spleenwort, rattlesnake fern and Christmas fern are regularly found.
Leaf litter	

Yellow Oak Dry Calcareous Forest S1

Description/Concept	A dry, often open, oak – sugar maple forest with a rich understory.
Topography	Steep slopes and summits of low knolls or ridges underlain by calcium rich limestone or dolostone.
Soils/Substrate	Shallow soil often with areas of exposed or limestone bedrock.
Canopy	Yellow oak is characteristic, but is rarely dominant and usually coexists with sugar maple, white oak and black oak which are more likely to dominate. Red oak, white ash, shagbark hickory, pignut hickory, white pine and hemlock are also present.
Sub-canopy	Yellow oak is common in the subcanopy, but it is also present with other canopy trees and hop hornbeam.
Shrub layer	Tall shrubs include ironwood, pagoda-dogwood, bladdernut and occasionally prickly ash.
Herb layer	Rich in species, including Pennsylvania sedge, broadleaf sedge, thread-leaved sedge, mountain ricegrass, bottlebrush-grass, hog peanut, early meadow-rue, blunt-lobed hepatica, lance-leaf bedstraw, broad-leaved ragwort and wild germanium.
Leaf litter	

Hickory – Hop Hornbeam Forest/Woodland S2

Description/Concept	Open, mixed hardwood forest. Occurrences tend to be very small (< 10 acres typically) and are often integrated into surrounding forests. Great variation in environmental conditions between sites.
Topography	Generally located in mid-slope on southern or eastern exposures below balds, outcrops, and traprock ridges.
Soils/Substrate	Deep, moist soils.
Canopy	Shagbark, pignut and mockernut hickories are the dominant overstory trees. Red oak, white ash and red and sugar maples can be present as well
Sub-canopy	Hop-hornbeam is a regular and abundant subcanopy tree.
Shrub layer	
Herb layer	Nearly continuous cover of graminoids, including: Pennsylvania sedge, long-stalked sedge, loose-flowered woodland-sedge, bottlebrush grass, poverty grass, and Canada bluegrass, with scattered violets, blunt lobed hepaticas, wood sorrrels and tick-trefoils.
Leaf litter	

Red Oak – Sugar Maple Transition Forest S4

Description/Concept	Mix of northern (maples) and central hardwoods (oaks). May be old field successional or formerly managed woodlots.
Topography	North to northeast facing mid-slope below 475m (~1560ft).
Soils/Substrate	Rocky, somewhat acidic and intermediate fertility soils.
Canopy	**Northern red oak, sugar maple and variable proportions of beech, black birch, and <20% conifers (white pine and hemlock)** White and black oaks, red maple, white ash and yellow birch are also associated.
Sub-canopy	
Shrub layer	Sparse, but typical species include striped maple, maple-leaved viburnum, beaked hazelnut, mountain laurel and witch hazel
Herb layer	Patchy and dominated by ferns, including intermediate wood fern, Christmas fern, hay scented fern and clubmosses. Wild sarsaparilla, Indian cucumber, Canada mayflower, whorled wood-aster and broad-leaved woodland-sedge are also present.
Leaf litter	

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

Rich, Mesic Forest S3

Description/Concept	A variant of the northern hardwood forest. Restricted to elevations below 2,400ft.
Topography	East or south east-facing, concave, mid-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. Pagoda dogwood, leatherwood or red-berried elderberry may be present.
Herb layer	Dense, with combinations of species that include bloodroot, maidenhair fern, late blue cohosh, sweet cicely, Dutchman's breeches, squirrel corn, toothwort, wild leek, Goldie's fern and zigzag goldenrod. **Plantain-leaf sedge is a semi-evergreen sedge that is fairly distinct to the Rich, Mesic Forest.**
Leaf litter	<1 year's accumulation; quickly incorporated into soil.

Dry, Rich Oak Forest/Woodland S4

Description/Concept	Deciduous forest with rich understory of herbs and grasses.
Topography	Southwest facing mid-slopes and coves.
Soils/Substrate	Slightly acid, often rocky of intermediate fertility. Well-drained loams.
Canopy	Dominated by a mixture of oaks (red, white, black), maples (red and sugar), American beech, white ash, and hickories (shagbark, pignut, sweet pignut.) Eastern hemlock occasionally is present.
Sub-canopy	Open. Flowering dogwood and hop-hornbeam.
Shrub layer	Fairly sparse. Saplings of canopy tree species, witch hazel and maple-leaved viburnum are common.
Herb layer	Rich. Blunt-lobed hepatica, perfoliate bellwort, four-leaved milkweed, early meadow-rue, false foxgloves, wild coffee, bush clovers, tick-trefoils, reflexed sedge, ribbed sedge, and big star-sedge are present.
Leaf litter	

Successional Northern Hardwood Forest S5

Description/Concept	A broadly defined time sequence of forest communities, ranging from young sprouts to mature.
Topography	Areas with past disturbance (management, fire, natural disasters) in areas where northern hardwood forests are present.
Soils/Substrate	Dry-mesic to mesic
Canopy	Seldom closed and dominated by shade intolerant species. Typical trees include aspen, white birch, red maple, black cherry and gray birch. White pine or red spruce may present in low percentages. Early colonizers include pin cherry and as the forest matures sugar maple, red maple, white ash, yellow birch, American beech, and red oak are common in the understory.
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.)]

Oak – Hickory Forest S4

Description/Concept	Somewhat enriched, broadly defined, variable hardwood forest dominated by oaks with hickories mixed in at a lower density.
Topography	Slopes, ridge tops, usually with a southwest, south, or southeast 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 white ash, black birch, sassafras, and red maple. Conifers constitute <25% cover and contain white pine and/or eastern hemlock.
Sub-canopy	Hop-hornbeam, flowering dogwood, downy shadbush, American chestnut, and witch-hazel.
Shrub layer	Low, common, diverse. Maple-leaved viburnum, blueberries, beaked and American hazelnuts, and gray dogwood may be present.
Herb layer	Richer than many oak forests. Typical plants include silverrod, tick-trefoil, wild sarsaparilla, rattlesnake weed, false Solomon's seal, pink lady's slipper, and patches of long-beaked Pennsylvania sedge or Pennsylvania sedge.
Leaf litter	

Black Oak – Scarlet Oak 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	Sandy, gravelly or rocky
Canopy	**Black oak is dominant, with a high proportion of scarlet oak.** White oak and red maple are common
Sub-canopy	Sparsely populated by grey birch, black cherry, sassafras, flowering dogwood and shadbush.
Shrub layer	Lowbush blueberries, huckleberry and scrub oak form a low shrub layer, with sheep laurel, maple-leaved viburnum and American hazelnut scattered throughout.
Herb layer	Sparse and scattered with patches of Pennsylvania sedge, bracken fern and pink lady's slipper. Wintergreen may be dense in areas with little past soil disturbance.
Leaf litter	Deep oak leaf litter.

Coastal Forest/Woodland S4

Description/Concept	Shorter than forests inland, but taller than Maritime Forests (around 10-20m (~30-60ft)). Shrubs and vines are dense near edges. **Away from the daily influence of salt spray, but can receive salt during storms.**
Topography	Occur in protected areas along the coast, behind dunes and on slopes away from the ocean.
Soils/Substrate	
Canopy	Scarlet, black, white, and chestnut oaks are dominant. Post oak important in Buzzards Bay area and on Martha's Vineyard. Red maple, sassafras, black cherry, black gum, American beech, pitch pine, and white pine commonly occur. (Usually low %, but may be abundant.) Red cedar can be scattered and is sometimes is dominant in woodland thickets.
Sub-canopy	American holly is a regular associate in Southeastern Massachusetts.
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. Vines that are abundant on edges include poison ivy, Virginia creeper, grape and greenbriers.
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, MNHESP lists it as a Mixed Coniferous – Deciduous community.

Mixed Oak Forest/Woodland S5

Description/Concept	Broadly defined community of tree oaks that grades into other more narrowly defined communities. Many examples have small trees that have diameters of ~6-8" with occasional >10" trees.
Topography	Exposed acidic talus or rocky slopes.
Soils/Substrate	Dry soils or exposed slopes.
Canopy	Variable mix of oak species (black, white, red, scarlet, and chestnut) with birches and white and red maple. White pine, if present, makes up <25% of the canopy.
Sub-canopy	Dense patches. Saplings of canopy species plus gray birch, striped maple, mountain maple, witch hazel, shadbush and/or chestnut.
Shrub layer	May be dense patches of huckleberry and mountain laurel.
Herb layer	Scattered, but primarily wild sarsaparilla and Pennsylvania sedge.
Leaf litter	

Sugar Maple – Oak – Hickory Forest S3

Description/Concept	Species rich forest associated with outcrops of circumneutral rock and slopes. Occurs in small patches within forests with shared species.
Topography	Slopes with a southeast to southwest aspect.
Soils/Substrate	Circumneutral rock
Canopy	**Dominated by sugar maple and red oak.** Black birch; white ash; black, white and/or chestnut oaks; shagbark, pignut, mockernut and/or bitternut hickory are common. Basswood occurs as very scattered individuals.
Sub-canopy	Sparse with saplings of canopy trees and others including hop hornbeam and red maple.
Shrub layer	Tall shrubs are sparse and consist of pagoda dogwood. Shorter shrubs include maple-leaf viburnum.
Herb layer	Varies from sparse to intermittent. Spring ephemerals include bloodroot and trout-lily. Wild geranium, herb Robert, false Solomon's seal, wild licorice, maidenhair fern, bottlebrush grass and large amounts of white wood aster are common later in the year. Woodland-sedge is close to being an indicator of the community.
Leaf litter	

Open Oak Forest/Woodland S3

Description/Concept	Open, savanna or park-like communities on mountain slopes with short trees. Often occurs between a rocky summit and the surrounding taller forest. Short forest (commonly <10m (~30ft), but to <20m (~60ft) Commonly contains areas of the Rocky Summit/Rock Outcrop Community.
Topography	Gradual slopes surrounded by forests.
Soils/Substrate	Very shallow to bedrock
Canopy	Low forest coverage (~37% to ~60%). Dominated by red oak, with lower cover of white oak and red maple.
Sub-canopy	Sparse amounts of hop-hornbeam and striped maple, red and white oaks and maple-leaf viburnum.
Shrub layer	Dense patches of huckleberry, chokeberry, mountain laurel and early sweet lowbush blueberry.
Herb layer	Continuous (except on rock outcrops) lowbush blueberry dominates. Forest seedlings of forest trees with common hairgrass, pale corydalis, early goldenrod, spreading ricegrass, fringed bindweed, running shadbush, downy goldenrod and wild columbine.
Leaf litter	

Oak – Tulip Tree Forest S1

Description/Concept	Forested areas situated in moist soils that is most commonly identified by the presence of tulip trees. Very similar to Red Oak – Sugar Maple transition forest, but due to the presence of tulip trees and lacks a strong mix of species of northern areas they are considered different.
Topography	Gentle, moist, north or east facing concave slopes, or on well-drained flats at the base of the slopes
Soils/Substrate	Circumneutral to slightly acidic, with one site being rocky.
Canopy	Dominated by red oak. Red and sugar maples, black and yellow birches, white and black oaks, sassafras, and white ash are also present **Multiple mature tulip trees are the defining species.**
Sub-canopy	May include species found in the canopy scattered with white pine, eastern hemlock, striped maple, and witch-hazel.
Shrub layer	Witch hazel is often the most dominant shrub. Maple-leaf viburnum is also abundant. Mountain laurel and beaked hazelnut are present in other sites.
Herb layer	Continuous (except on rock outcrops) lowbush blueberry dominates. Forest seedlings of forest trees with common hairgrass, pale corydalis, early goldenrod, spreading ricegrass, fringed bindweed, running shadbush, downy goldenrod and wild columbine.
Leaf litter	

Chestnut Oak Forest/Woodland S4

Description/Concept	Oak forest dominated by chestnut oak that occur as long narrow bands along dry ridges and upper slopes. Often occurs within a mosaic with closed oak or pine – oak forest and more open communities.
Topography	Dry ridgetops and upper slopes. Can extend down steep, convex, rocky, often west or south facing slopes.
Soils/Substrate	Thin soil over acidic bedrock.
Canopy	Closed to partially open (>25% cover). Dominated, often completely, by chestnut oak. Black, red, white, and/or scarlet oak can occur in lower numbers. Red maple and white or pitch pines can also occur.
Sub-canopy	Sparse. Contains canopy species along with black birch and sassafras.
Shrub layer	May be scattered tree saplings. Mountain laurel, striped maple, American chestnut and witch hazel are common tall shrubs. Shorts shrubs are dense in patches with black huckleberry and lowbush-blueberries dominant. Sheep laurel can be scattered.
Herb layer	Sparse and dominated by wintergreen. False foxgloves, sedges and bracken fern are occasionally present.
Leaf litter	Deep oak leaf litter with slow decomposition.

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

	Forest Seep	Yellow Oak Dry Calcareous Forest	Hickory Hop-hornbeam	Red Oak - Sugar Maple Transition	Rich Mesic Forest	Dry, Rich Acidic Oak Forest	Sugar Maple – Oak – Hickory	Oak – Tulip Tree
Ash, Black								
Ash, White	Occurs	Occurs	Dominant	Occurs	Char.	Dominant	Occurs	Occurs
Aspen, Quaking		Occurs						
Avens, Purple								
Avens, Water	Occurs							
Baneberry, White					Occurs			
Basswood					Char.		Rare	
Beech, American				Dominant				
Bellwort, Perfoliate						Occurs		
Birch, Black				Dominant			Occurs	Occurs
Birch, Paper	Occurs							
Birch, Yellow	Occurs			Occurs				Occurs
Bladderwort		Occurs						
Bloodroot					Occurs		Occurs	
Bracken (fern)				Occurs				
Buckthorn, Alder-leaf								
Bush Clover						Occurs		
Cedar, Eastern Red		Occurs						
Cicely, Sweet					Occurs			
Cinquefoil, Shrubby								
Clubmoss				Occurs				
Coffee, Wild						Occurs		
Cohosh, Blue					Occurs			
Currant, Wild Black								
Dogwood, Alternate-leaved					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		Occurs	

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

	Forest Seep	Yellow Oak Dry Calcareous Forest	Hickory Hop-hornbeam	Red Oak - Sugar Maple Transition	Rich Mesic Forest	Dry, Rich Acidic Oak Forest	Sugar Maple – Oak – Hickory	Oak – Tulip Tree
Fern, Ostrich	Occurs							
Fern, Rattlesnake	Occurs							
Fern, Sensitive								
Geranium, Wild		Occurs					Occurs	
Ginger, Wild					Occurs			Common
Goldenrod, Downy							Occurs	
Goldenrod, Rough-leaved								
Goldenrod, Zigzag					Occurs			
Grass, Bottlebrush			Char.				Occurs	
Grass, Canada Blue			Char.					
Grass, Poverty			Char.					
Grass-of-Parnassus								
Hackberry		Occurs						
Hemlock, Eastern	Occurs						Occurs	Occurs
Hepatica			Occurs					
Hickory								
Hickory, Bitternut					Char.		Regular	
Hickory, Pignut			Regular			Dominant	Regular	
Hickory, Shagbark		Occurs	Regular			Dominant	Regular	
Hickory, Sweet Pignut			Regular			Dominant		
Hobblebush				Occurs				
Hop-hornbeam		Occurs	Regular		Occurs	Occurs	Occurs	
Indian Cucumber				Occurs				
Ironwood								
Jack-in-the-pulpit								
Jewelweed								
Leatherwood					Occurs			
Maple, Red	Occurs			Occurs		Dominant	Occurs	
Maple, Striped				Occurs				Occurs
Maple, Sugar	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	Regular	
Oak, Chestnut					None		Regular	
Oak, Northern Red		Occurs	Dominant	Dominant	Occurs	Dominant	Dominant	
Oak, Scarlet					None	Dominant		

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

	Forest Seep	Yellow Oak Dry Calcareous Forest	Hickory Hop-hornbeam	Red Oak - Sugar Maple Transition	Rich Mesic Forest	Dry, Rich Acidic Oak Forest	Sugar Maple – Oak - Hickory	Oak – Tulip Tree
Oak, Swamp White					None			
Oak, White		Occurs		Occurs	None	Dominant	Occurs	
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								
Sedge, Thread-leaved		Occurs						
Sedge, Yellow								
Sedge, Woodland							Char.	
Sicklepod		Occurs						
Spleenwort, Silvery	Occurs							
Spruce, Red	Occurs							
Squirrel Corn					Occurs			
Tick-trefoil			Occurs			Occurs		
Toothwort					Occurs			
Tulip Tree								Char.
Viburnum, Maple-leaf				Occurs	Occurs			Common
Violet, Three-lobed			Occurs					
Willow, Autumn								
Willow, Hoary								
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	Oak - Hickory	Black Oak – Scarlet Oak	Mixed Oak	Coastal Forest/ Woodland	Open Oak Forest/ Woodland	Chestnut Oak
Ash, White		Occurs					
Aspen, Big toothed				Occurs			
Aspen, Quaking	Dominant			Occurs			
Bearberry					Occurs		
Beech, American					Occurs		
Birch, Black		Occurs		Occurs			Occurs
Birch, Gray	Common		Occurs	Occurs			
Birch, White	Dominant						
Blueberry, Lowbush		Char.	Occurs	Occurs	Dominant	Common	Dominant
Bluestem, Little					Occurs		
Bracken (fern)			Occurs		Occurs		
Bush-clover					Occurs		
Cedar, Eastern Red							
Cherry, Black	Dominant		Occurs		Occurs		
Cherry, Pin	Common						
Chestnut, American		Occurs		Occurs			Common
Corydalis, Pale				Occurs		Common	
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							
Hepatica		Occurs					
Hickory, Mockernut		Occurs					
Hickory, Pignut		Occurs					
Hickory, Shagbark		Occurs					
Hickory, Sweet Pignut		Occurs					
Holly, American					Occurs		
Hop-hornbeam		Occurs				Occurs	
Huckleberry, Black			Occurs	Occurs	Dominant	Common	Dominant
Lady's Slipper, Pink			Occurs				
Laurel, Mountain				Occurs			Common
Maple, Red	Dominant	Occurs	Occurs	Occurs	Occurs	Dominant	Occurs
Milkwort					Occurs		
New Jersey Tea		Char.					

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

	Successional Northern Hardwoods	Oak - Hickory	Black Oak – Scarlet Oak	Mixed Oak	Coastal Forest/ Woodland	Open Oak Forest/ Woodland	Chestnut Oak
Oak, Black		Dominant	Dominant	Dominant	Dominant		Occurs
Oak, Chestnut				Dominant	Dominant		Dominant
Oak, Dwarf Chinquapin							
Oak, Northern Red		Dominant		Dominant		Dominant	Occurs
Oak, Post					Occurs		
Oak, Scarlet		Dominant	Dominant	Dominant	Dominant		Occurs
Oak, Scrub			Occurs	Occurs			
Oak, Swamp White							
Oak, White		Dominant	Occurs	Dominant	Dominant	Dominant	Occurs
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				Occurs
Silverrod		Occurs					
Solomon's Seal, False		Occurs					
Sweet Fern				Occurs			
Tick-trefoil		Occurs					
Viburnum, Maple-leaf		Char.	Occurs			Occurs	
Wintergreen					Occurs		
Witch-Hazel		Occurs					Common

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.)

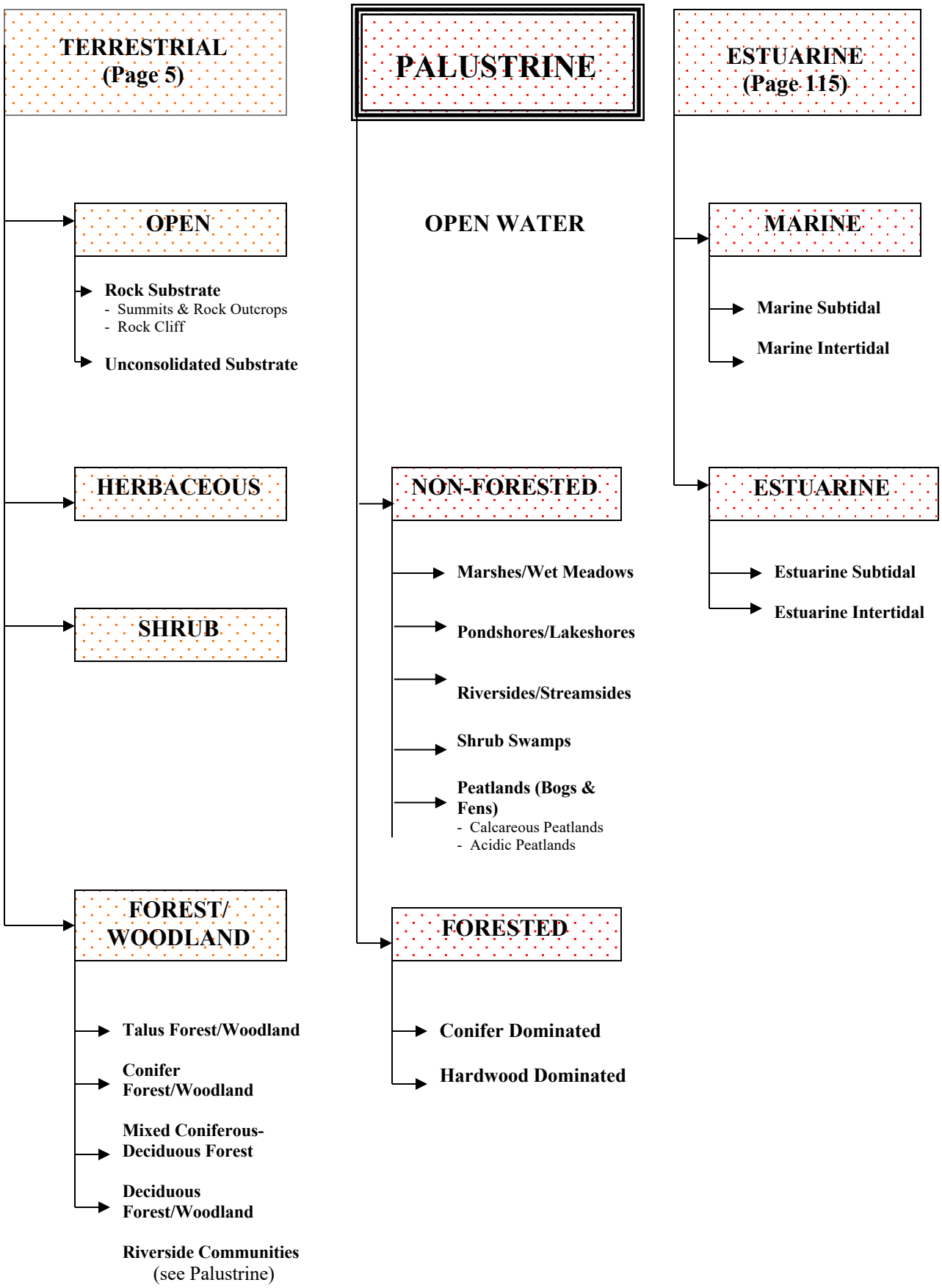
Hierarchical classification of natural communities within the Terrestrial System

Sub-System	Community Group	Community Sub-group	Community Type
Open	Rock Substrate	Summits and Rock Outcrops	Riverside Rock Outcrop Acidic Rocky Summit/Rock Outcrop Calcareous Rocky Summit/Rock Outcrop Circumneutral Rocky Summit/Rock Outcrop Open Talus/Coarse Boulder
		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 Sandplain Grassland – Inland Variant

Shrub	N/A	N/A	Ridgetop Heathland Sandplain Heathland Sandplain Heathland – Inland Variant Maritime Shrubland Maritime Pitch Pine Woodland 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	Conifer Forest/Woodland	N/A	Hemlock Forest
			Successional White Pine
			High Elevation Spruce – Fir Forest
	Mixed Coniferous-Deciduous Forest/Woodland	N/A	Spruce – Fir Northern Hardwoods Forest
			Oak – Hemlock – White Pine Forest
			Northern Hardwoods – Hemlock – White Pine
			White Pine – Oak Forest
			Maritime Juniper Woodland/Shrubland
			Pitch Pine – Oak Forest/Woodland
			Maritime Forest/Woodland
			Coastal Forest/Woodland
	Deciduous Forest/Woodland	N/A	Forest Seep
			Yellow Oak Dry Calcareous Forest
			Hickory – Hop Hornbeam Forest/Woodland
			Red Oak – Sugar Maple Transition Forest
			Rich, Mesic Forest
			Dry, Rich Oak Forest
			Successional Northern Hardwood Forest
			Oak – Hickory Forest
			Black Oak – Scarlet Oak Woodland
			Coastal Oak Forest/Woodland
			Mixed Oak Forest/Woodland
			Sugar Maple – Oak – Hickory Forest
			Open Oak Forest/Woodland
			Oak – Tulip Tree Forest
			Chestnut Oak Forest/Woodland


TERRESTRIAL
(Page 5)
PALUSTRINE
ESTUARINE
(Page 115)
OPEN
Rock Substrate
- Summits & Rock Outcrops
- Rock Cliff
Unconsolidated Substrate
HERBACEOUS
SHRUB
FOREST/
WOODLAND
Talus Forest/Woodland
Conifer
Forest/Woodland
Mixed Coniferous-
Deciduous Forest
Deciduous
Forest/Woodland
Riverside Communities
(see Palustrine)
OPEN WATER
NON-FORESTED
Marshes/Wet Meadows
Pondshores/Lakeshores
Riversides/Streamsides
Shrub Swamps
Peatlands (Bogs &
Fens)
- Calcareous Peatlands
- Acidic Peatlands
FORESTED
Conifer Dominated
Hardwood Dominated
MARINE
Marine Subtidal
Marine Intertidal
ESTUARINE
Estuarine Subtidal
Estuarine Intertidal

NON-FORESTED
(< 50% tree canopy)

MARSHES/WET MEADOWS (Herbaceous dominated) **Page 64**

Interdunal Marsh/Swale
Deep Emergent Marsh
Shallow Emergent Marsh
Wet Meadow
Kettlehole Wet Meadow (Overlaps coastal plain pondshore)

PONDSHORES/LAKESHORES (Adjacent to bodies of fresh water) **Page 69**

Calcareous Pondshore/Lakeshore
Acidic Pondshore/Lakeshore
Coastal Plain Pondshore
Coastal Plain Pondshore – Inland Variant
River and Lake Drawdown

RIVERSIDES/STREAMSIDES (Adjacent to flowing fresh water) **Page 73**

Riverside Seep
High-energy Riverbank
Low-energy Riverbank
Riverine Pointbar and Beach
Freshwater Mud Flat
High-energy Rivershore Meadow

SHRUB SWAMPS (Shrub dominated) **Page 77**

Shrub Swamp

NON-FORESTED (<50% tree canopy)
(CONTINUED)

PEATLANDS (BOGS AND FENS) – Substrate of sphagnum or other organic matter

CALCAREOUS PEATLANDS **(Mineral-rich water with accumulation of organic matter)**
(Page 78)

Calcareous Basin Fen
Calcareous Sloping Fen
Calcareous Seepage Marsh

ACIDIC PEATLANDS **(Acidic conditions with sphagnum)**
(Page 81)

Sea-Level Fen
Acidic Graminoid Fen
Acidic Shrub Fen
Highbush Blueberry Thicket
Level Bog
Kettlehole Level Bog
Acidic Graminoid Fen-Spillway Fen

FORESTED
(>50% tree canopy)

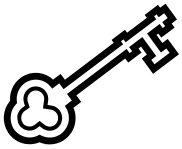
CONIFER DOMINATED **Page 88**

Hemlock Swamp
Spruce – Tamarack Bog
Atlantic White Cedar Bog
Alluvial Atlantic White Cedar Swamp
Northern Atlantic White Cedar Swamp
Coastal Atlantic White Cedar Swamp
Inland Atlantic White Cedar Swamp
Red Spruce Swamp
Rich Conifer Swamp

HARDWOOD DOMINATED **Page 97**

Cobble Bar Forest
Red Maple Swamp
High-terrace Floodplain Forest
Alluvial Red Maple Swamp
Red Maple - Black Ash - Tamarack Calcareous Seepage Swamp
Black Gum - Pin Oak - Swamp White Oak Perched Swamp
Major-river Floodplain Forest
Small-river Floodplain Forest
Transitional Floodplain Forest
Red Maple – Black Gum Swamp
Alluvial Hardwood Flat
Red Maple - Black Ash Swamp
Red Maple - Black Ash – Bur Oak Swamp

MARSHES/WET MEADOWS COMMUNITIES



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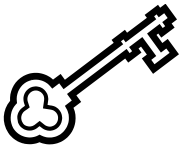
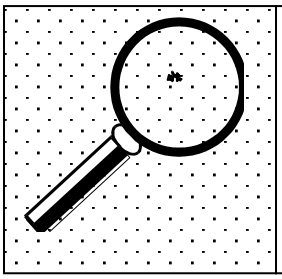


1. Located in shallow depressions among sand dunes.	A. Yes –Interdunal Marsh/Swale B. No – Go to 2
2. Water depth typically >0.5 ft.	A. Yes – Deep Emergent Marsh [a] B. No – Go to 3
3. Seasonally inundated.	A. Yes – Go to 4 B. No – Wet Meadow
4. In kettlehole, with vegetation zoned from driest to wettest.	A. Yes – Kettlehole Wet Meadow B. No – Shallow Emergent Marsh [a]



There is a ***great deal of overlap*** between the Shallow Emergent Marsh and the Wet Meadow. The key factor, hydrology, can only be evaluated during the growing season.

Use hydrology, location, and community descriptions to identify the correct Marshes/Wet Meadows community.

a. The MNHESP is hoping to identify additional characteristics that will further differentiate the Deep Emergent Marsh and Shallow Emergent Marsh community types.

Hydrology of Marshes/Wet Meadows Communities

Community	Inundation	Soil Saturation
Interdunal Marsh/Swale	N/R	N/R
Deep Emergent Marsh	Seasonal	Permanent
Shallow Emergent Marsh	Seasonal	Permanent
Wet Meadow	Temporary	Permanent
Kettlehole Wet Meadow	Seasonal	N/R

N/R = Not reported in Swain and Kearsley (2001.)

Locations of Marshes/Wet Meadows Communities

Community	Dunes	Rivers	Streams	Pond	Lake	*Beaver Flowage*	Wet Depressions	Sloughs	Backwater	Kettlehole
Interdunal Marsh/Swale	X									
Deep Emergent Marsh		X	X	X	X					
Shallow Emergent Marsh		X	X	X	X	X				
Wet Meadow			X		X		X	X	X	
Kettlehole Wet Meadow										X

NOTE: This is not an exhaustive list of where these communities occur. Rather, it is a listing of locational information contained in Swain and Kearsley (2001.)

Description of Marshes/Wet Meadows Communities

Interdunal Marsh/Swale S2

Description/Concept	**Graminoid or shrub dominated** community occurring in shallow basins (swales) **between sand dunes.** Either shrub or graminoid dominated. May be seasonally flooded or permanently inundated, with water coming from groundwater and precipitation.
Topography	Low, shallow depressions that form between sand dunes along the coast.
Soils/Substrate	Soils generally have a thin, about 1 cm, organic layer over coarse sand.
Canopy	Scattered pitch pine and eastern red cedar may occur.
Sub-canopy	
Shrub layer	SHRUB-DOMINATED COMMUNITY: Large cranberry (often >90% cover); Sphagnum moss, sheep laurel, bayberry and other wetland shrubs can occur.
Herb layer	SHRUB-DOMINATED COMMUNITY: Rushes, spatulate-leaved and thread-leaved sundews, beak sedges. Yellow-eyed grasses, St. John's-worts, southern bog clubmoss. rose pogonia, grass-pink, nodding ladies-tresses, occasional arethusa and ragged fringed orchis. GRAMINOID DOMINATED: Rushes, beak-sedges, and other graminoids. Interdunal swales have large numbers of Plymouth gentian.
Leaf litter	

Deep Emergent Marsh S4

Description/Concept	Tall graminoid/emergent herbaceous wetlands occurring on saturated, mucky mineral soils that are seasonally inundated and permanently saturated. Occur along rivers and stream, lakes, artificial impoundments and other waterbodies **Water depth between 0.5 - 3 ft year round.**
Topography	Broad, flat areas bordering low-energy rivers and streams, or along pond and lake margins.
Soils/Substrate	Mixture of organic and mineral components. Typically, well-decomposed organic muck layer over mineral soil. Seasonally inundated and permanently saturated.
Canopy	
Sub-canopy	
Shrub layer	Sweet-gale, meadowsweet and hardhack may be scattered throughout the more dense herbaceous layer.
Herb layer	Broad-leaved cat-tail, phragmites for extensive dense stands. Narrow-leaved cat-tail occurs in more alkaline sites or in saline areas along roads. Wool-grass, common threesquare, Canada bluejoint, reed canary-grass, rice cut-grass and tussock–sedge are characteristic graminoids. Arrow-leaf tearthumb, bulblet water-hemlock, swamp-candles, beggar-ticks, bedstraw, common arrowhead, slender-leaved goldenrod and marsh-fern are common associates. Speckled and smooth alders and highbush blueberry are generally sparse tall shrubs, constituting <25% cover.
Leaf litter	

[Decision rules: DM category = >50% tall graminoids (e.g., cat-tail, phragmites, wool-grass.)]

Shallow Emergent Marsh S4

Description/Concept	Grass, sedge, and/or rush dominated wetlands on mucky mineral soils that are seasonally inundated and permanently saturated. Standing or running water during growing season and throughout much of year. **Water depth less than deep emergent marshes, and average less than 15cm (~6in).** Vegetation composition similar to deep emergent marshes except that shorter grasses, sedges, and rushes dominate. **May be difficult to differentiate from wet meadows based on species composition alone. You must separate these communities based on physical setting and hydrologic regimes.**
Topography	Broad, flat areas bordering low-energy rivers and streams, or along pond and lake margins. Commonly occur in abandoned beaver flowages.
Soils/Substrate	Mixture of organic and mineral components. Typically a layer of well-decomposed organic muck at the surface overlaying mineral soil.
Canopy	
Sub-canopy	
Shrub layer	Spiraea, red osier dogwood, leatherleaf and sweet gale are common low shrubs with <25% coverage.
Herb layer	Sensitive fern, marsh fern, swamp-candles, marsh St-John's wort, Joe-Pye-weeds, bone set, and water-horehound are common forbs. Areas with shallow water typically have a mixture of bur-reeds, sedges, and rice cut-grass. More open water areas often support water-lilies and pondweeds. Duckweed is abundant in still water. In tussock sedge-dominated marshes in old beaver flowages scattered alder and Spiraea is common.
Leaf litter	

[Decision Rules: M category = >50% short grasses, sedges, and rushes.]

Wet Meadow S4

Description/Concept	Graminoid/emergent herbaceous communities that are similar to deep and shallow emergent marshes, except that they are **temporarily rather than seasonally flooded.** **Standing water is <u>not</u> present during the growing season.** Repeated disturbance keeps this community open. Woody plants can become established due to the lack of seasonal flooding if there is not repeated disturbance. Often uniform communities dominated by a single species of rush or grass. Often called "sedge meadows" in other states.
Topography	Occur in lake basins, wet depressions, along streams, sloughs, and other areas with impeded drainage along river.
Soils/Substrate	Muck mineral soils that are permanently saturated and occasionally flooded.
Canopy	
Sub-canopy	
Shrub layer	Tussock forming sedges (e.g., tussock-sedge, marsh-sedge) often dominant, with >50% cover; variable proportions of other graminoids and herbaceous species. Typical graminoids: Canada bluejoint, wool-grass, woolly-fruited sedge, slender spike sedge, stalked wool-grass, rice cut-grass, and brown beak-sedge.
Herb layer	Characteristic herbaceous associates: water smartweed, river-horsetail, nodding bur-marigold, spotted Joe-Pye-weed, and northern blue flag. Calcareous wet meadows have additional lime-loving species like red-footed spike-sedge, delicate sedge and fen-sedge.
Leaf litter	

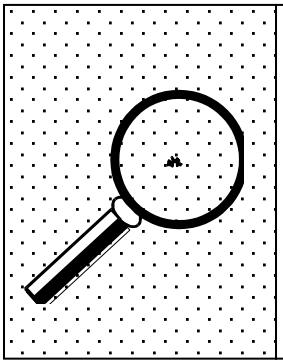
Kettlehole Wet Meadow **S3**

Description/Concept	Graminoid/emergent herbaceous or mixed shrub/herbaceous communities restricted to small (usually <5 acres) seasonally inundated, kettle depressions in sandy glacial outwash. A variant of wet meadows. Seasonally inundated by local runoff and ground water fluctuations. For most of summer they look like shallow ponds, but by late summer are covered by emergent vegetation. Zonation; characterized by a series of plant associations along a gradient from higher (i.e., drier) to lower (i.e., wetter.) Sedges and rushes dominate.
Topography	Kettleholes.
Soils/Substrate	Sandy outwash soils. Shallow, mucky peats.
Canopy	Tupelo, swamp white oak and red maple can occur.
Sub-canopy	
Shrub layer	Typically fringe community, species include: leatherleaf, high bush blueberry, buttonbush, and water willow.
Herb layer	Often covered with graminoids by the end of the summer when the water is low. Wool grass can be close to a monoculture when present. Meadow bulrush, red-stemmed bulrush, and Torrey's Bulrush, tussock-sedge, bayonet rush, pondshore rush, creeping bent grass, mannagrass, marsh fern and beggar's ticks are common and can be dominant.
Leaf litter	

PONDSHORES/LAKESHORES COMMUNITIES

Shortcut Key: Check full descriptions following use

1. Pondshore sparsely vegetated, with gravel, sand, or muddy shore.	A. Yes – Go to 2 B. No – Go to 4
2. Shore surrounding calcareous or circumneutral lake or pond. Typically located in Berkshire County.	A. Yes – Calcareous Pondshore/Lakeshore B. No – Go to 3
3. Shore surrounding acidic lake, may occur throughout Massachusetts.	A. Yes –Acidic Pondshore/Lakeshore
4. Pondshore vegetated, with vegetation arranged in concentric circles, corresponding to changes in water level.	A. Yes – Coastal Plain Pondshore B. No – Go to 5
5. Pondshore vegetate, with vegetation arranged in concentric circles, corresponding to changes in water level, but in the Connecticut River Valley.	A. Yes – Coastal Plain Pondshore – Inland Variant B. No – Go to 6
6. Sparsely vegetated exposed drawdown area of a reservoir or behind a dam.	A. Yes – River and Lake Drawdown



When determining Pondshores/Lakeshores communities look at the shore's substrate; is it vegetated or is it made up of exposed sediments?

Vegetated shores with identifiable concentric patterns of vegetation are an indication of a Coastal Plain Pondshore.

In most of Massachusetts the default community will be the Acidic Pondshore/Lakeshore.

Descriptions of Pondshores/Lakeshores Communities

Calcareous Pondshore/Lakeshore S2

Description/Concept	Gravelly vegetated sandy or muddy shores of calcareous or circumneutral inland lakes and ponds. Submerged or saturated for a significant part of the year or continuously in wet years. Restricted to limestone areas of Berkshire County.
Topography	Inland lake and pond basins. Some are steep mineral banks, some are gradual.
Soils/Substrate	Mineral soil, may range in texture from fine silts to sand and gravel. Mucky sediments may occur after accumulation of organic material.
Canopy	Trees from surrounding northern hardwoods-hemlock-white pine forests form much of the canopy.
Sub-canopy	
Shrub layer	Red maple, speckled alder, and swamp rose are abundant in many areas.
Herb layer	Dominated by awned sedge, porcupine sedge, lakeside sedge, tussock sedge, threeway sedge, and soft-stemmed spikerush and other sedges. Northern blue flag is common on shores. Shallow water adjacent to the shoreline includes bur reeds. Ponds contain mats of green alga stonewort and several species of pondweeds.
Leaf litter	

Acidic Pondshore/Lakeshore S4

Description/Concept	Broadly defined vegetation of acidic pondshores defined to cover most of the pondshores found throughout the state that are not explicitly excluded as calcareous pondshores and shores of ponds or lakes in isolated depressions on sand or gravel with low water cycles. Often narrow (<1m wide) and submerge or saturated for a significant part of the year or continuously in wet years. Shallow ponds with little fluctuation in water levels are often shrub dominated. Ponds with more regular disturbances are sparser.
Topography	Inland lake and pond basins.
Soils/Substrate	Gravel, sand, or mud.
Canopy	
Sub-canopy	
Shrub layer	Highly variable among sites. Common shrubs along the shore include mountain laurel, maleberry, mountain holly, arrow-wood, leatherleaf, rhodora, steeple-bush, and American filbert.
Herb layer	Diverse and highly variable. Commonly includes spotted Joe-pye-weed, tussock-sedge, northern water-horehound, and royal fern. Water species grow adjacent to the shoreline and can merge into it, with more gradual shores resembling beaches and supporting species like golden pert.
Leaf litter	

NOTE: According to Swain and Kearsley (2001), this community is not known from Boston Basin, Narragansett/Bristol Lowland, or Cape Cod/Long Island sub-ecoregions. However, these pondshores clearly occur along the coastal plain (e.g., Mashpee-Wakeby Pond, Mashpee, Upper Mill Pond, Brewster.)

Coastal Plain Pondshore S3

Description/Concept	Herbaceous communities of exposed pondshores. Most commonly in Southeastern Massachusetts., Cape Cod, and the Islands. Shallow, highly acidic, low nutrient groundwater ponds in sandy glacial outwash with no inlet or outlet. Characterized by distinct coastal plain flora. **Vegetation in zones, corresponding to water level.** **Not every pond has every zone, and zones vary in width and species composition from year to year.** Water rises and falls with changes in water table. Shoreline typically exposed in summer, may remain inundated in wet years.
Topography	Shallow groundwater ponds in glacial outwash, usually with no inlet or outlet.
Soils/Substrate	Usually sand, sometimes with cobbles. Surface layer of organic muck occurs on some ponds and pondshores.
Canopy	Adjacent, upland oak/pine forest.
Sub-canopy	
Shrub layer	Borders the shore, dominated by highbush blueberry; associated with sweet pepper-bush and green briar.
Herb layer	Mixture of herbaceous and graminoid plants that can include state-rare species. Slender-leaved flat-topped golden pert, beaksedge, lance-leaf violet and dwarf St. John's-wort are common of the intermediate area of beach. Flooded zones are characterized bayonet rush, spike-rushes or pipewort. Deeper water includes yellow water-lily, white water-lily and Robbins spike-rush.
Leaf litter	

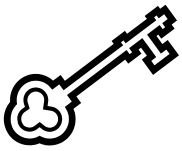
Coastal Plain Pondshore – Inland Variant S1

Description/Concept	Herbaceous communities of exposed pondshores. Similar to the Coastal Plain Pondshore, but found in the Connecticut River Valley. Develops in groundwater flooded depressions in outwash sand plains outside of southeastern Massachusetts. **Vegetation in zones, corresponding to water level.** **Not every pond has every zone, and zones vary in width and species composition from year to year.** Natural fluctuation of water levels throughout any particular year and between years is necessary for the community to develop. Shorelines range from broad expanses of mucky shores on very shallow, muddy ponds with shrub islands to narrow sandy shores on ponds in steep depressions and large sand bottomed ponds where shore line ranges from sand to deep muck. Essentially all examples of this community have been impacted by recreation and development.
Topography	Groundwater flooded depressions in outwash sand plains.
Soils/Substrate	Variable, from muck to sand
Canopy	
Sub-canopy	
Shrub layer	Borders the shore, dominated by highbush blueberry; associated with red maple often grading into water-willow.
Herb layer	Flatsedges, rushes, smartweeds, false pimpernel and St. John's-worts are common of pondshore zones. Semipermanently flooded zone characterized by spike-rushes, pipewort, beak-rushes/horned-sdeges, golden pert, seedboxes or water pourslane, or false pimpernel, or stranded aquatic plants. Open water zone includes yellow and white water-lily.
Leaf litter	

River and Lake Drawdown **SNR**

Description/Concept	Sparsely to moderately vegetated exposed drawdown areas of reservoirs and behind dams. Develop on sediments exposed when water levels are low in impounded waterbodies. Sites submerged when impoundments are full. Large areas of bottom sediments may be exposed as a result of drawdown. Vegetation varies in space and time due to differences in substrate, flooding regime, length of time since flooding and geography.
Topography	May be expansions of riverside beaches and pointbars, or mudflats exposed by drawdown for any reason including for dam repair or removal.
Soils/Substrate	Wide variability. Rocky or sandy sediments can occur where water regularly flows, or mudflats where water is slow or still.
Canopy	
Sub-canopy	
Shrub layer	
Herb layer	Weedy species dominate in recently exposed sediments. Typical species include smartweeds, water purslane, false pimpernel, sandbar-lovegrass, sand sedge, awned flatsedge, spike-rushes, and beak rushes or horned sedge. Some floating plants left stranded may temporarily survive, with water lilies, bulrushes and rushes. A wide range of other native and non-native species may occur.
Leaf litter	

RIVERSIDE/STREAMSIDE COMMUNITIES



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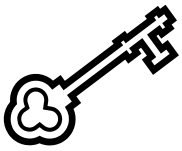
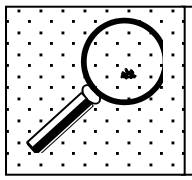


1. Community located along the bottom of the upland slope of a riverbank, with water seeping from the bank into the river.	A. Yes – Riverside Seep B. No – Go to 2
2. Muddy substrate. Community located along muddy stream sides or in muddy shallows of river backwaters or ox-bows.	A. Yes – Freshwater Mud Flat B. No – Go to 3
3. Substrate of cobble (i.e., rocks), sand, and silt. Gradient of substrate types from river's edge to upland transition area.	A. Yes – High-energy Riverbank B. No – Go to 4
4. Community occurring on sandy or silty soils, with a mixture of herbs, grasses, and occasional scattered shrub or tree.	A. Yes – Low-energy Riverbank B. No – Go to 5
5. Exposed sand bar or beach with sparse herbs and grasses.	A. Yes – Riverine Pointbar and Beach B. No – Go to 6
6. Substrate of cobble and a gradient of substrates from where water slows, but level to gently sloping.	A. Yes – High-energy Rivershore Meadow



These communities are easily separated on the basis of substrate, and also by their location. Begin by identifying if the substrate is rock, sand, or mud.

Descriptions of Riverside/Streamside Communities

Riverside Seep S2

Description/Concept	Mixed, high diversity herbaceous community where groundwater discharge provides mineral enrichment, often kept open by flood and ice scour. Often associated with riverside rock outcrop communities or gravel bars and talus slopes. Groundwater flow varies substantially among seeps; some dry out during summer, others flow year-round.
Topography	Along base of steep riverbanks **where groundwater seeps** from the bottom of the upland slope.
Soils/Substrate	Organic soils are rarely present except in sheltered areas.
Canopy	Canopy from surrounding community.
Sub-canopy	
Shrub layer	Speckled alder and willows are often present, but not dominant.
Herb layer	Variable. Year-round seeps include brown beak-rush, creeping spike-rush, scabrous sedge, sallow sedge, northern awned-sedge, wool-grass, grass-leaf rush, jointed rush, marsh rush, soft rush, Canada bluejoint, fascicled panic-grass, riverbank wild rye, upland bentgrass, green-fruited bur-reed, northern dwarf St. John's-wort, swamp saxifrage, sensitive fern, and marsh bellflower. Characteristic herbs include spotted Joe-Pye-weed, boneset, orange jewelweed and fringed loosestrife. Muskflower, Canadian burnet and golden alexanders are good indicator species of the community type.
Leaf litter	

High-energy Riverbank S3

Description/Concept	Sparse, open herbaceous/graminoid communities occurring on cobble and sand substrates of steep-gradient, fast-flowing rivers that experience severe flooding and ice scour. Vegetation zonation corresponds to substrate type and severity of flooding. Occur within the zone of active erosion and sedimentation of steep-gradient, fast-flowing rivers and are shaped by continued annual flood events and winter ice scour. Occur as both narrow rocky zones along riverbanks and large areas of exposed, upstream ends of riverine islands.
Topography	High-gradient rivers.
Soils/Substrate	**Cobble, sand, and silt**. Gradient of substrate from river's edge to upland transition.
Canopy	Cobblebars may have tree canopy, but must be <30% cover (else the community is a Cobble Bar Forest.)
Sub-canopy	
Shrub layer	Short shrubs, such as shadbush, silky dogwood, willows, and sapling sycamores form a vegetation zone on the sandiest sections bordering floodplain forests that occupy siltier soils.
Herb layer	On cobble, false dragonhead, cocklebur, beggar's ticks, and lady's thumb are dominant, with colt's-foot, wild heal-all, and scattered riverside-sedge less so. As the percent of sand increases, water horsetail and clasping dogbane occur and there is a distinct band of switch grass. In sandier areas, mixed grasslands of switchgrass, big and little bluestem, Indian grass, and goldenrods occur.
Leaf litter	

Low-energy Riverbank S4

Description/Concept	Open herbaceous/graminoid communities occurring on sandy or silty soils of river and streambanks that do not experience severe flooding or ice scour. Often occur between higher gradient sections of the river where there are rapids and rocky shorelines. Narrow and develops on gravelly bars and shorelines just above low summer water levels but below high spring water levels. More sparsely vegetated than marshes and wet meadows.
Topography	Low gradient rivers.
Soils/Substrate	Generally **sandy or silty.** **Lack cobble and mud.** Occur on mineral soil, rather than peaty or mucky soil.
Canopy	
Sub-canopy	Occur in local patches, most commonly of speckled alder, dogwoods, black elderberry, and highbush blueberry.
Shrub layer	Mix of herbaceous and graminoid species with occasional scattered trees and shrubs at the inland margin. Variable structure. Common species are: reed canary grass, cockspur-grass, fall panic-grass, rice cut-grass, Canada bluejoint, devil's pitchforks, smartweeds, orange Jewelweed, cardinal flower, various goldenrods, and sensitive and royal ferns.
Herb layer	
Leaf litter	

Riverine Pointbar and Beach S4

Description/Concept	Sparsely vegetated exposed sand/gravel beaches and pointbars of rivers and large streams. River currents move faster on the outside of a turn and more slowly on the inside. Scoured by ice in the spring and periodic flooding during high water periods following snow melt or after major storm events, which limits the extent to which woody vegetation can become established and the amount of soil deposition that can occur. Beaches and pointbars can move around in the channel.
Topography	High-gradient rivers.
Soils/Substrate	**Sands and gravels.**
Canopy	
Sub-canopy	
Shrub layer	Sand bar willow may occur at higher margins.
Herb layer	Sparse, with bare sand and gravel dominating. Tall beggar's ticks is typical but will be scattered. Smartweeds, cocklebur, soft-stemmed spike-sedge, Smith's club-sedge, awned flatsedge, pondshore-flatsedge, lovegrasses, and Cardinal Flower often growing on pointbars of smaller rivers.
Leaf litter	

Freshwater Mud Flat S4

Description/Concept	Sparsely vegetated herbaceous community dominated by low, usually annual herbs developing on recently exposed muddy pond or river bottom sediments. **Succession to other communities occurs at all sites.**
Topography	Exposed low-gradient stream channels, backwaters, abandoned channels, beaver ponds, oxbow ponds and other ponds that are usually flooded during winters or other times of high water.
Soils/Substrate	River bottom sediments. Mucky, silty, poorly drained mineral soils.
Canopy	Oxbows contain silver maple or American elm providing partial cover.
Sub-canopy	
Shrub layer	
Herb layer	Sparse, but dominated by annuals or herbaceous perennials. Water-purslane, smartweeds, rice cut-grass, swamp-candles, ditch-stonecrop, or little spike-rush. Mudflat spike-rush is restricted to calcareous or circumneutral mudflats. Ponds may include yellow water-lily, duckweeds, and bladderworts.
Leaf litter	

High-energy Rivershore Meadow S2

Description/Concept	Variably sized, occurring in about 10m wide bands along medium to high energy river channels. Occur in areas that are kept open by flooding and ice scouring. Just above summer low water levels of high-energy rivers, frequently floods. Vegetation structure and composition varies considerably within the community.
Topography	Level to gently sloping in frequently flooded areas.
Soils/Substrate	Large sediments like cobbles along the river, with sand and smaller materials accumulating where water slows, often in gradients.
Canopy	
Sub-canopy	
Shrub layer	
Herb layer	Dominated by perennial graminoid and forb species, with narrow low-lying areas containing brown beak-rush, spike-rushes, riverside-sedge, prairie dogbane, groundnut, deer-tongue, swamp candles, fringed loosestrife, field-mint, blue monkey-flower, obedient plant, small purple-fringed orchids, Canadian burnet, grass-leaf flat-topped goldenrod and New York aster. Higher areas are characterized by big bluestem, Canada bluejoint, tall flat-topped white aster, riverbank wild rye, spotted Joe-Pye-weed, sunflower, reed canary-grass and goldenrods, with the highest areas being dominated by interrupted fern, speckled alder, and glossy alder-buckthrown.
Leaf litter	

SHRUB SWAMP COMMUNITIES

Description of Shrub Swamp Community

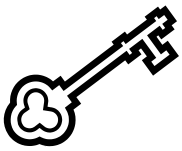
Shrub Swamp	**S5**
Description/Concept	Shrub dominated wetlands occurring on soils that are seasonally or temporarily flooded. Often occur in transition zone between emergent marshes and swamp forests. Highly variable communities.
Topography	Occur in basin depressions, at pond margins, and along river and streamsides. Also, in any flat area where water table is at or above surface for most of year.
Soils/Substrate	Mineral, or mucky mineral soils. Generally well-decomposed organic mucks that are permanently saturated, but only seasonally or temporarily inundated.
Canopy	
Sub-canopy	Scattered red maple, gray birch, white pine and other forested swamp tree species saplings.
Shrub layer	Shrub height may be from <1m to 5m of uniform height or mixed. Wetland shrubs dominate the community, but can be of variable density, from dense (>75% cover) to fairly open (25-75% cover). Actual species composition is highly variable between sites. Dominant and codominant shrub species include speckled alder, smooth alder, meadowsweet, steeplebush, buttonbush, maleberry, swamp azalea, silky dogwood, winterberry, sweet gale, pussy willow, black willow, arrowwood and poison sumac. Circumneutral water swamps often have abundant spicebush. Dewberry, water-willow and Canadian burnet are also common for low shrubs.
Herb layer	Often sparse and species poor. A mixture of the following species is typical: common arrowhead, skunk cabbage, cinnamon fern, sensitive fern, royal fern, marsh fern, sedges, bluejoint grass, bur reed, virgin's-bower, swamp candles, clearweed, sphagnum and turtlehead.
Leaf litter	

[Decision Rules: SS community = >50% shrub dominated.]

***NOTE*:** Because there is only one shrub swamp community type there is no key provided.

NOTE: Cranberry bogs do not fall under the natural community classification system, as they are human created and maintained wetlands. However, because cranberry plants are woody, the shrub swamp is the closest category for cranberry bogs.
[Decision Rules: Cranberry bogs are placed in the CB category.]

CALCAREOUS PEATLANDS COMMUNITIES
(Mineral rich water with an accumulation of organic matter)



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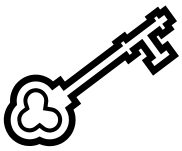
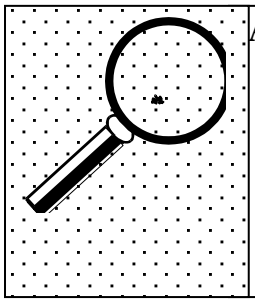


1. Sedge and shrub dominated community, with an organic mat. Typically occurs in a well-defined basin with deep organic sediments.	A. Yes – Calcareous Basin Fen B. No – Go to 2
2. Sedge dominated community located on a slight to moderate slope. Hummocks of organic matter and areas of exposed mineral soil are frequently present.	A. Yes – Calcareous Sloping Fen B. No – Go to 3
3. Open emergent community with scattered shrubs. Substrate typically has 50-200 cm of moderate to well-decomposed organic sediments. Basin may be level or sloped.	A. Yes – Calcareous Seepage Marsh



Approach identification of these communities by first considering if a consolidated or floating organic mat is present. This will either confirm or eliminate the possibility of a Calcareous Basin Fen.

Next, consider the overall structure of the vegetation. Calcareous Seepage Marshes will be structurally similar to other, more familiar types of emergent marshes.

Descriptions of Calcareous Peatlands Communities

Calcareous Basin Fen S1

Description/Concept	Sedge-shrub peatlands occurring in a well-defined basin. Inputs of calcareous groundwater and, sometimes, surface water. Permanently saturated deep (>2m (6.5ft)) conditions.
Topography	In a well-defined basin.
Soils/Substrate	Deep organic sediments and peat.
Canopy	
Sub-canopy	
Shrub layer	Sparse shrub layer. Sweet gale among dominant species in this community. **Lacks swamp birch and hoary willow.**
Herb layer	Sedge dominated. Dominant species include slender woolly-fruited sedge, water-sedge, along with narrow-leaved cat-tail and white beaksedge, Typical bog/fen species present include pitcher plant, large cranberry, round-leaved sundew, and white beak-sedge. Grass-of-Parnassus and other calcium-loving species present. **Lacks typical marsh species such as marsh fern and tussock sedge.**
Leaf litter	

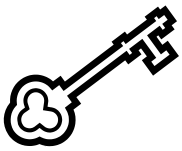
Calcareous Sloping Fen S2

Description/Concept	Open, sedge dominated wetland with calcareous groundwater seepage. Considered rare species “hot spots.” May occur as multiple patches in a wetland or in wetland complexes with other wetland community types. Groundwater seepage may be visible as distinct rivulets.
Topography	Slight to moderate slopes.
Soils/Substrate	Exposed mineral soils exposed in areas of heavy groundwater discharge. Small hummocks of organic material may be present.
Canopy	Sparse cover. Common trees include white pine, larch, red maple and alders.
Sub-canopy	
Shrub layer	Sparse cover. Common shrubs include shrubby cinquefoil, autumn-willow, and alder-leaf buckthorn. Shrubby autumn, hoary and silky willow are present. Disturbed areas have reduced shrubby growth.
Herb layer	**Dominated by sedges**, such as inland prickly sedge, delicate sedge, yellow sedge, and tussock-edge, marsh-sedge and porcupine sedge. Typical associates include marsh muhly, fowl mannagrass, Kalm’s lobelia, water-horehound, grass-of-Parnassus, rough-leaved goldenrod, fen-goldenrod, and marsh fern.
Leaf litter	

Calcareous Seepage Marsh S2

Description/Concept	Open, mixed herbaceous/graminoid/shrub wetlands that experience some calcareous groundwater seepage. Shrubs scattered in a mix of herbaceous and graminoid plants with some areas of open water where herbaceous vegetation may occur on floating mats during the growing season. Calcareous groundwater maintains the community in a variety of settings.
Topography	Level to slightly sloping sites.
Soils/Substrate	Typically 50 – 200+ cm (1 – 6.5ft) of moderate to well-decomposed organic sediments.
Canopy	
Sub-canopy	
Shrub layer	Diverse, but generally not dense. Winterberry, buttonbush, highbush blueberry, swamp rose, meadowsweet, alders, poison-sumac, hoary willow, autumn willow, swamp-birch and shrubby cinquefoil all may be present.
Herb layer	**A mixture of typical marsh species and calcium loving species.** Typical marsh species include cattails, sweet flag, lakeside sedge, tussock sedge, cinnamon fern, royal fern, swamp milkweed and swamp loosestrife Calcium-loving species include Labrador bedstraw, grass-of-Parnassus, Kalm's lobelia, hemlock parsley, and slender cotton-grass
Leaf litter	

ACIDIC PEATLANDS COMMUNITIES
(Acidic Conditions, with Sphagnum)



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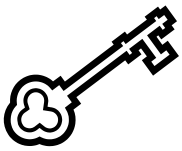
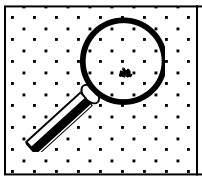


1. Community graminoid dominated.	A. Yes – Go to 2 B. No – Go to 3
2. Occurs at estuary/upland interface.	A. Yes – Sea-level Fen B. No – Go to 7
3. Shrub dominated community with highbush blueberry dominant.	A. Yes – Highbush Blueberry Thicket B. No – Go to 4
4. Shrubs low growing and interwoven.	A. Yes – Acidic Shrub Fen B. No – Go to 5
5. Peatland located in a kettlehole and characterized by a mixture of tall and short ericaceous shrubs.	A. Yes – Kettlehole Level Bog B. No – Go to 6
6. Peatland characterized by a mixture of tall and short ericaceous shrubs ***not*** located in a kettlehole.	A. Yes – Level Bog
7. Dense and low growing basin with scattered canopy cover, with some surface water flow but does not see annual herbicide.	A. Yes – Acidic Graminoid Fen B. No – Acidic Graminoid Fen – Spillway Fen



Approach identification of these communities by considering the type of vegetation (e.g., grass versus shrubs), the height of vegetation (for shrubs), and the location of the community.

Locations of Acidic Peatland Communities

Location	Community Type
Basin with inlets and outlets	Acidic Graminoid Fen
	Acidic Shrub Fen
	Level Bog
	Acidic Graminoid Fen – Spillway Fen
Estuary/upland interface	Sea-level Fen
Headwater of streams	Level Bog
Isolated valley bottom	Level Bog
Kettle hole	Kettlehole Level Bog
	Highbush Blueberry Thicket
Pond margin	Acidic Shrub Fen
	Level Bog

NOTE: This is not an exhaustive list of where these communities may be found. Rather, it is a list of locations identified by Swain and Kearsley (2001) for these communities.

Acidic Peatland Community Vegetation Types

Vegetation	Community Type
Graminoid Dominated	Acidic Graminoid Fen
	Sea-level Fen
	Acidic Graminoid Fen – Spillway Fen
Shrub Dominated Low Growing/Dwarf Shrubs	Acidic Shrub Fen
Tall Shrubs	Level Bog
	Kettlehole Level Bog
	Highbush Blueberry Thicket

Descriptions of Acidic Peatlands Communities

Sea-level Fen S1

Description/Concept	**Herbaceous/graminoid peatlands** that occur at the upland edges of ocean tidal marshes. Plant community of freshwater and estuarine species. Two hydrologic influences: acidic freshwater seepage from the uplands and brackish overwash from the adjacent marsh. Near their northern limits in Massachusetts, much more developed to the south.
Topography	Interface between estuarine marshes and upland seepage slopes.
Soils/Substrate	
Canopy	
Sub-canopy	
Shrub layer	Occasionally poison sumac, swamp azalea, bayberry, groundsel-tree and eastern red cedar are present
Herb layer	Sphagnum is common in all acidic peatlands, forming a mat that the vascular plants grow on. Diagnostic species from elsewhere in northeast include: saltmarsh straw-sedge, saltmarsh spike-sedge, and saltmarsh-threesquare. Twig-sedge is also an identifier for the community when present on the edges of salt marshes Other common species from the northeast include New York aster, spatulate-leaved sundew, Canada rush, pondshore-rush, swamp-candles, common reed, white beak-sedge, swamp rose, common threesquare, poison ivy, large cranberry and marsh St. John's-wort.
Leaf litter	

Acidic Graminoid Fen S3

Description/Concept	Sedge/Sphagnum dominated peatlands. Mixed graminoid/herbaceous acidic peatland. Some groundwater or surface water flow, but no calcareous seepage. Standing water present throughout much of growing season.
Topography	In basins, typically with inlets and outlets.
Soils/Substrate	
Canopy	Patchy tree and shrub cover. Red maple, white or pitch pine and Atlantic white cedar may occur.
Sub-canopy	
Shrub layer	Occur in clumps, but are not dominant throughout. Lacks extensive leatherleaf and water-willow. Large cranberry may be abundant. Patchy tree and shrub cover. Shrubs include: sweet pepper-bush, swamp azalea, poison sumac, and bayberry.
Herb layer	Sphagnum is common in all acidic peatlands, forming a mat that the vascular plants grow on. Graminoid species are abundant, with cotton-grasses, beaked sedge, wooly-fruited sedge, white-beaked sedge, twig-sedge, and pondshore-rush being good indicator species. Threeway sedge and buckbean are often found at fen edges. Characteristic herbaceous species include St. John's-wort, arrow-arum and rose pogonia.
Leaf litter	

Acidic Shrub Fen S3

Description/Concept	**Shrub dominated** acidic peatland characterized by a mixture of low growing, primarily deciduous shrubs. Composed primarily of low-growing, interwoven shrubs with patches of sphagnum moss growing at the shrub bases. Some groundwater and/or surface water flow/connectivity but not calcareous seepage. Similar in structure to dwarf ericaceous shrub bogs, but they are wetter with a less well-developed sphagnum mat. Standing water is present throughout much of the growing season.
Topography	Typically found along wet pond margins.
Soils/Substrate	
Canopy	Scattered red maple and Atlantic white cedar may occur.
Sub-canopy	
Shrub layer	Dense and low growing (<1m tall). Leatherleaf, sweet gale, water-willow and meadow-sweet are typical. Highbush blueberry, red maples, alder and/or sweet-pepperbush may be scattered throughout.
Herb layer	Can be abundant and diverse, or quite sparse. St. John's-worts and arrowheads are typical Cotton-grasses and beak-rushes are also typical sedges.
Leaf litter	

Highbush Blueberry Thicket S4

Description/Concept	Tall acidic peatlands **dominated by dense highbush blueberry bushes** on hummocky sphagnum moss. Occurs as a border thicket around more open peatlands or coastal plain ponds and within small basins or seasonally (spring and early summer) flooded zones within larger wetlands. Sphagnum mat variable.
Topography	Many known examples of this community occur in kettleholes.
Soils/Substrate	
Canopy	
Sub-canopy	
Shrub layer	**Dominated by highbush blueberry.** Swamp azalea, winterberry, sweet pepper-bush and scattered red maple are common associates. Typical short shrubs include leatherleaf, sheep laurel and dwarf huckleberry.
Herb layer	Variable and sparse, but can be locally abundant. Cinammon fern, royal fern, marsh fern, sensitive fern, Virginia chain-fern, pitcher plants, marsh St. John's-wort, three-leaved Solomon's seal, wild calla, northern water-horehound and threeway sedge also common. A layer of peatmoss is common and varies in cover.
Leaf litter	

Level Bog S3

Description/Concept	Acidic dwarf ericaceous shrub peatlands. Characterized by a **mixture of tall and short shrubs** that are predominantly ericaceous. Generally have pronounced hummock-hollow topography. Receive little or no stream flow and are isolated from water table.
Topography	Along pond margins, at headwaters of streams, or in pockets with large basins.
Soils/Substrate	
Canopy	Scattered, stunted trees, primarily tamarack and black spruce with red maple, occur throughout.
Sub-canopy	
Shrub layer	**Leatherleaf is dominant.** Other typical ericaceous shrubs include: rhodora, sheep laurel, bog laurel, bog rosemary, Labrador tea, highbush blueberry and low-growing large and small cranberry.
Herb layer	Sphagnum is common in all acidic peatlands, forming a mat that the vascular plants grow on.
Leaf litter	

[Decision Rules: BG community is indicated by the presence of moats/pools and vegetation mats. Shrubs and trees may be scattered throughout. Typically isolated from stream flow.]

Kettlehole Level Bog S2

Description/Concept	A **variant of level bogs.** Vegetation typically zoned in rings. Have an outer, wet moat. Typically small (<3 acres), round, and lack inlets. Vegetation typically zoned in rings
Topography	Kettle depression.
Soils/Substrate	Sandy glacial outwash.
Canopy	Scattered, stunted coniferous, primarily tamarack and black spruce, occur throughout.
Sub-canopy	
Shrub layer	Moat is often dominated by highbush blueberry and swamp azalea; with a ring of rhodora bordering the interior. Mat has a mixture of tall and short shrubs (predominantly ericaceous) including: leatherleaf (dominant), rhodora, sheep laurel, bog laurel, bog-rosemary, Labrador tea, and low-growing large and small cranberry. Many kettlehole level bogs in the state have abundant bog laurel and three-leaved Solomon's seal.
Herb layer	Sphagnum is common in all acidic peatlands, forming a mat that the vascular plants grow on.
Leaf litter	

[Decision Rules: KB community is similar to level bogs (BG) except that vegetation is zoned in rings.]

Acidic Graminoid Fen – Spillway Fen SNR

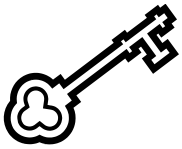
Description/Concept	Shallow acidic peatlands with mixed graminoid/herbaceous vegetation that develop on spillway bedrock channels associated with large dams. Sparsely vegetated due to disturbances cause by annual herbicide or mowing treatments to control woody plants.
Topography	Spillway bedrock channels
Soils/Substrate	
Canopy	
Sub-canopy	
Shrub layer	
Herb layer	Tawny cotton-grass, round-leaved sundew, rose pogonia, variegated scouring rush may cover substantial areas of the habitat Canadian St. John's-wort and spreading bulrush are reported at both sites. Uncommon species in Massachusetts that are found at one site include Alpine clubsedge, swamp-thistle and Northeastern willow-herb.
Leaf litter	

Plants Associated with Acidic Peatlands Communities

	Sea Level	Acidic Graminoid Fen	Acidic Shrub Fen	Level Bog	Kettlehole Level Bog	Highbush Blueberry Thicket
Alder			Typical			
Arrow-arum		Characteristic				
Arrow-weed			Occurs			
Aster, New York	Occurs					
Azalea, Swamp		Occurs			Dominant	
Bayberry		Occurs				
Beak-Sedge, White	Occurs	Indicator				
Blueberry, Highbush					Dominant	Dominant
Cedar, Atlantic White		Occurs	Occurs			
Cranberry, Large		Occurs		Typical	Occurs	
Cranberry, Small				Typical	Occurs	
Gale, Sweet			Typical			
Huckleberry, Dwarf						Occurs
Labrador Tea				Typical	Occurs	
Laurel, Bog				Typical	Occurs	
Laurel, Sheep				Typical	Occurs	Occurs
Leatherleaf		Minimal	Typical	Dominant	Dominant	Occurs
Maple, Red		Occurs	Occurs			
Meadowsweet			Typical			
Pepper-bush, Sweet		Occurs	Typical			
Pitcher Plant				Occurs		
Pogonia, Rose		Characteristic				
Poison Ivy	Occurs					
Reed, Common	Occurs					
Rhododendron						Common
Rhodora				Typical	Dominant	
Rose, Swamp	Occurs					
Rosemary, Bog				Typical	Occurs	
Rush, Canada	Occurs					
Rush, Pondshore	Occurs	Indicator				
Sedge, Beaked		Dominant				
Sedge, Slender Wooly-fruited		Dominant				
Sedge, Twig	Occurs	Indicator				
Solomon's Seal, Three-leaved					Occurs	
Spike-sedge, Saltmarsh	Characteristic					
Spruce, Black				Occurs	Occurs	
St. John's-wort			Occurs			
St. John's-wort, Marsh	Occurs					
Straw-sedge, Saltmarsh	Characteristic					
Sumac, Poison		Occurs				
Sundew				Occurs		
Sundew, Spatulate-leaved	Occurs					
Swamp-candles	Occurs					
Tamarack				Occurs	Occurs	
Threesquare, Common	Occurs					
Threesquare, Saltmarsh	Characteristic					
Water-willow		Minimal	Typical			

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.)

CONIFER DOMINATED COMMUNITIES



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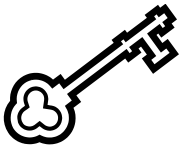
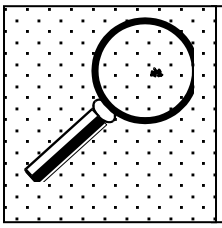


1. Hemlock dominant or co-dominant.	A. Yes – Go to 10 B. No – Go to 2
2. Spruce (black and/or red) dominant or co-dominant, **no** Atlantic white cedar present.	A. Yes – Go to 3 B. No – Go to 5
3. Black spruce and tamarack dominant in overstory.	A. Yes – Spruce – Tamarack Bog B. No – Go to 4
4. Red spruce dominant in overstory.	A. Yes – Red Spruce Swamp
5. Atlantic white cedar dominated peatland.	A. Yes – Atlantic White Cedar Bog B. No – Go to 6
6. Atlantic white cedar dominated swamp, occurring within floodplain of river, stream, or pond.	A. Yes – Alluvial Atlantic White Cedar Swamp B. No – Go to 7
7. Atlantic white cedar dominated swamp with black spruce and/or red spruce and/or balsam fir dominant in canopy.	A. Yes – Northern Atlantic White Cedar Swamp B. No – Go to 8
8. Coastal indicators (Virginia chain fern, netted chain-fern, inkberry, dangleberry, and bayberry) present **or** site within 5 miles of coast or below 60 ft. elevation.	A. Yes – Coastal Atlantic White Cedar Swamp B. No – Go to 9
9. Coastal indicators absent, **or** inland indicators (yellow birch, hemlock) present and "more abundant", **or** >5 miles from coast or 60 ft. above sea level in elevation.	A. Yes – Inland Atlantic White Cedar Swamp

10. Little light reaches the forest floor, with sparse and patchy shrub and herbaceous layers.
    - A. Yes – Hemlock Swamp
    - B. No – Rich Conifer Swamp



These communities are among the easiest to identify.

Begin by determining if the dominant vegetation is hemlock, spruce, or Atlantic white cedar. Also consider if your community is a swamp (i.e., open water) or a bog (i.e., mat of sphagnum present.)

Descriptions of Conifer Dominated Communities

Hemlock Swamp S4

Description/Concept	Acidic forested swamps where Eastern Hemlock is dominant or co-dominant. Little light reaches the forest floor due to a nearly closed canopy. Often contain standing water and small intermittent streams
Topography	Large or long depressions with a hummock-hollow topography.
Soils/Substrate	Hollows have wetter organic, peaty soils saturated throughout the year.
Canopy	**Eastern hemlock is the dominant and characteristic species.** May be in association with white pine, red maple, and yellow birch.
Sub-canopy	Patchy, and only canopy species saplings exist in the gaps created by windthrows.
Shrub layer	Sparse and patchy due to limited light passing through canopy. Typical shrubs include: winterberry, mountain laurel, highbush blueberry, currents, mountain holly, alders, witch hazel and maleberry
Herb layer	Cinammon fern, goldthread, partridgeberry and wild sarsaparilla are common. Sphagnum moss, liverwort and other mosses are also often present.
Leaf litter	

Spruce – Tamarack Bog S2

Description/Concept	Acidic forested peatlands with a usually short overstory of black spruce and tamarack, and an understory of heath shrubs on sphagnum moss. Usually occurs within older, more stable areas of larger wetland complexes that include other forested, shrub, and open community types. Forested bogs are late successional peatlands that occur on thick peat deposits. Northern/higher elevation occurrences may be more forest like.
Topography	Around more open bog mats.
Soils/Substrate	Thick peat deposits.
Canopy	**Black spruce and tamarack dominate the canopy.** Red spruce may occur in place of black spruce. White pine, pitch pine, and red maple may also occur. Old man's beard covers and drapes branches.
Sub-canopy	
Shrub layer	Often dense and about 2m (6.5ft) tall, but varies among geographic location. Labrador tea, creeping snowberry and to some extent bog laurel are common in the northern and western parts of the state. Sweet pepperbush tends to be more eastern and southern. Mountain holly, wild raisin, leatherleaf, winterberry, highbush blueberry, mountain laurel, sheep laurel, sweet-swampbells and maleberry are present throughout.
Herb layer	*Sphagnum* spp., three-seeded bog sedge, tussock sedge, three-leaved Solomon's seal, bluebead lily, goldthread, pitch plant, sensitive fern, marsh fern, cinnamon fern and creeping water arum. Dwarf mistletoe has been found, but is uncommon.
Leaf litter	

[Decision Rules: SpTa bg category = >75% black spruce or tamarack, alone or together.]

Atlantic White Cedar Bog S2

Description/Concept	Acidic forested peatland with a nearly continuous shrub layer and an open canopy in which Atlantic white cedar is the characteristic tree species. Semi-forested acidic dwarf-shrub peatlands – wetlands with peat that accumulates when saturated year round with water that is cool, acidic, poorly oxygenated, and low in nutrients. Many occur as small (<3 acre) openings within larger Atlantic White Cedar Swamps.
Topography	Variable. Pond borders, patches in large swamps, and on Cape Cod, in kettleholes where they are surrounded by upland Pitch Pine – Oak Forests and Pitch Pine – Scrub Oak Communities.
Soils/Substrate	Peat.
Canopy	Total canopy coverage is low (<25%). **Atlantic white cedar is dominant** with scattered red maple. Other occasional associates include: white pine, grey birch, pitch pine, and black spruce.
Sub-canopy	
Shrub layer	Scattered clumps. Tall shrubs include highbush blueberry and swamp azalea. Low shrub layer is often continuous and is dominated by leatherleaf and sheep laurel. Black and dwarf huckleberry, rhodora and bog rosemary are also present
Herb layer	Typically well-formed sphagnum moss layer beneath shrubs, with large and small cranberry, sundews and pitcher plants occurring throughout. Virginia chain-fern is common in peatlands in southeastern Massachusetts.
Leaf litter	

Alluvial Atlantic White Cedar Swamp S2

Description/Concept	Forested swamps occurring **along low-gradient rivers** where Atlantic white cedar is co-dominant with red maple. Highly variable in composition. Receives annual or semi-annual overbank flooding, making them more mineral-rich than other Atlantic White Cedar wetlands.
Topography	Occur within the floodplain of low gradient rivers or streams, or at the fringes of open marshy areas along ponds.
Soils/Substrate	Poorly drained, retains sediment saturating flood water well into the growing season. Typically silt loams with a mucky surface organic layer.
Canopy	**Atlantic white cedar and red maple dominate the canopy** layer.
Sub-canopy	
Shrub layer	Highbush blueberry, sweet pepper-bush, and silky dogwood.
Herb layer	Species common to very wet, open or enriched site, including: sensitive fern, royal fern, bugleweed, marsh fern, and marsh St. John's-wort.
Leaf litter	

[Decision Rule: Ce sw category >75% Atlantic white cedar.]

Northern Atlantic White Cedar Swamp S1

Description/Concept	A variant of spruce swamps in which Atlantic white cedar is an associate in the canopy. Standing water generally occurs for half of growing season or longer.
Topography	Restricted to high-elevation basins over 1100ft.
Soils/Substrate	Water-saturated peat overlies mineral sediments. Water and soil are nutrient poor, low in nitrogen and phosphorous. Soil is acidic, with a pH of 3.1 – 5.5.
Canopy	Dominated by northern conifers such as black and red spruce and balsam fir. Atlantic white cedar occurs as an associate.
Sub-canopy	
Shrub layer	High-bush blueberry, swamp azalea, mountain holly, creeping snowberry, and bunchberry. Labrador team and rhodora are common.
Herb layer	
Leaf litter	Water saturated peat.

[Decision Rule: Ce sw category >75% Atlantic white cedar.]

Coastal Atlantic White Cedar Swamp S2

Description/Concept	Basin swamps dominated by Atlantic white cedar in overstory and a mixture of coastal species in understory. Standing water present for >50% of growing season.
Topography	Typically occur in basins at low elevations (<60 ft. above sea level.)
Soils/Substrate	Sand and gravel deposits or glacial lake bottom sediments. Water-saturated peat overlying mineral sediments. Soil nutrient poor, low in nitrogen and phosphorous, high in iron.
Canopy	**Atlantic white cedar is dominant**, mixed with red maple. Pitch pine, white pine, and hemlock are infrequent associates.
Sub-canopy	
Shrub layer	May be very dense. High bush blueberry, swamp azaelea, sweet pepper-bush and swamp-sweetbells. Inkberry common in this community on Cape Cod.
Herb layer	Sparse and patchy. Cinnamon fern, Virginia chain-fern, starflower, and wild sarsaparilla. Ground layer dominated by sphagnum moss.
Leaf litter	Acidic conditions make leaf litter decomposition slow.

[Decision Rule: Ce sw category >75% Atlantic white cedar.]

NOTE: For eastern Massachusetts this is the default category for all non-alluvial Atlantic white cedar swamps within 5 miles of the coast and/or below 60 ft. elevation above sea level (pers. comm., P. Swain.)

Inland Atlantic White Cedar Swamp S2

Description/Concept	Basin swamps dominated by Atlantic white cedar in overstory. Hemlock, spruce, red maple, and yellow birch co-occur. Coastal indicator species are lacking. Standing water present for >50% of growing season, but some surface water movement and groundwater seepage from nearby steep till deposits occurs.
Topography	Typically occur in basins at >40 ft. above sea level (>60 ft. according to P. Swain, pers. comm.).
Soils/Substrate	Sand and gravel deposits or glacial lake bottom sediments. Water-saturated peat overlying mineral sediments. Soil nutrient poor, low in nitrogen and phosphorous.
Canopy	**Atlantic white cedar is dominant.** Associated species are variable dependent on elevation. <700ft. contains hemlock, red maple and yellow birch >700ft. contains hemlock and spruce.
Sub-canopy	
Shrub layer	Lower elevation sites typically have sweet pepper-bush and winterberry Higher elevation sites have abundant mountain holly
Herb layer	Cinnamon fern, starflower, and Canada Mayflower are common. High elevation sites also have northern species such as creeping snowberry and bunchberry
Leaf litter	Acidic conditions make leaf litter decomposition slow.

[Decision Rule: Ce sw category >75% Atlantic white cedar.]

Red Spruce Swamp S3

Description/Concept	Forested wetlands, primarily of high elevations in western and north-central Massachusetts, dominated by Red Spruce.
Topography	Higher elevation, poorly drained basins with no obvious inlets and small intermittent outlets that may form stream headwaters.
Soils/Substrate	Deep (often >2m) organic, acidic and nutrient poor sediments
Canopy	**Dominated by red spruce**. Variable, but much lower abundances of white pine, eastern hemlock, balsam fir, red maple, black spruce, black gum and yellow birch.
Sub-canopy	Low in cover, comprised of one or more of the canopy species
Shrub layer	Fairly sparse. Highbush blueberry, wild raisin, winterberry, and occasionally swamp azalea or maleberry.
Herb layer	May be prominent and dominated by cinnamon fern with bluebead-lily, creeping snowberry, Massachusetts fern, goldthread, bunchberry, three-seeded bog sedge, star flower and wild sarsaparilla may occur in lower abundances. Sphagnum moss carpets the ground.
Leaf litter	

Rich Conifer Swamp S3

Description/Concept	Species-rich, mixed conifer swamp with a high proportion of deciduous trees. Mineral-enriched water flows or seeps into the community and supports a high diversity of species in all strata while saturating the soil for much of the year.
Topography	Hummocky
Soils/Substrate	Deep pockets of muck
Canopy	**Dominated by conifers.** Eastern hemlock, balsam fir or red spruce are typical, with red maple, yellow birch, American elm, and black ash mixed in.
Sub-canopy	
Shrub layer	Dense in patches. Spicebush, witch hazel or hornbeam are common.
Herb layer	Variable and diverse. Jack-in-the-pulpit, foamflower, lesser miterwort, wild oats, oak-fern, slender mannagrass, delicate sedge, swamp-saxifrage, northern horse-balm, golden ragwort, golden saxifrage, rough-leaved goldenrod, swamp-goldenrod and purple avens are present.
Leaf litter	

Plants Associated with Conifer Dominated Communities

	Hemlock Swamp	Spruce – Tamarack Bog	Red Spruce Swamp	Atlantic White Cedar Bog	Alluvial Atlantic White Cedar Swamp	Northern Atlantic White Cedar Swamp	Coastal Atlantic White Cedar Swamp	Inland Atlantic White Cedar Swamp	Rich Conifer Swamp
Alder	Occurs								
Ash, black									Occurs
Azalea, Swamp				Occurs			Common		
Bayberry							Occurs		
Birch, Grey				Occurs					
Birch, Paper			Occurs						
Birch, Yellow	Occurs		Occurs					Occurs	Occurs
Bishop's Cap			Typical						
Blueberry, Highbush	Occurs			Occurs	Occurs		Common	Occurs	
Bog-sedge, Three-seeded		Occurs							
Bugleweed					Occurs				
Bunchberry						Occurs			
Cedar, Atlantic White				Dom.	Co-dom.	Occurs	Dom.	Dom.	
Chain-Fern, Virginia							Occurs		
Cherry, Black			Occurs						
Cranberry, Large				Occurs					
Cranberry, Small				Occurs					
Dangleberry							Occurs		
Dogwood, Silky					Occurs				
Elm, American									Occurs
Fern, Cinnamon	Occurs						Occurs	Occurs	
Fern, Marsh					Occurs				
Fern, Royal			Typical		Occurs				
Fern, Sensitive	Occurs				Occurs				
Fetterbush							Common	Occurs	
Fir, Balsam			Dom.			Dom.			Dom.
Foamflower									Occurs
Goldthread	Occurs	Occurs	Typical						
Hemlock, Eastern	Dom./Char.		Occurs				Infreq.	Occurs	Dom.
Hobble-bush			Occurs						
Huckleberry, Black				Occurs					
Huckleberry, Dwarf				Occurs					
Inkberry							Occurs		
Labrador Tea		Occurs				Common			
Laurel, Bog		Occurs							
Laurel, Sheep		Occurs	Occurs						
Leatherleaf				Dom.					
Lily, Bluebead		Occurs	Typical						
Maple, Mountain			Occurs						
Maple, Red	Occurs	Occurs	Occurs	Occurs	Co-dom.		Common	Occurs	Occurs
Mayflower, Canada								Occurs	
Miterwort, Lesser			Typical						Occurs
Moss	Occurs	Occurs	Occurs						
Mountain-ash, American			Occurs						
Mountain-holly	Occurs	Occurs	Occurs			Occurs			
Pepper-bush, Sweet					Occurs		Common	Occurs	
Pine, Pitch		Occurs		Occurs			Occurs		
Pine, White	Occurs	Occurs	Occurs	Occurs			Infreq.		
Pitcher Plant				Occurs			Infreq.		
Pyrola, One-sided			Typical						
Rhodora						Common			

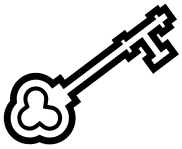
Plants Associated with Conifer Dominated Communities (continued)

	Hemlock - Hardwood Swamp	Spruce – Tamarack Bog	Spruce - Fir Boreal Swamp	Atlantic White Cedar Bog	Alluvial Atlantic White Cedar Swamp	Northern Atlantic White Cedar Swamp	Coastal Atlantic White Cedar Swamp	Inland Atlantic White Cedar Swamp	Rich Conifer Swamp
Sarsaparilla, Wild							Occurs		
Sedge, New England			Typical						
Sedge, Northern Awned			Typical						
Snowberry, Creeping		Occurs	Typical			Occurs			
Solomon's Seal, Three-leaved		Occurs							
Sphagnum		Occurs		Common			Dom.		
Spruce, Black		Dom.	Occurs	Occurs		Dom.			
Spruce, Red		Dom.	Dom.			Dom.			Dom.
Starflower							Occurs	Occurs	
St. John's-wort, Marsh					Occurs				
St. John's-wort, Pale			Typical						
Sundew				Occurs					
Tamarack		Dom.	Occurs						
Usnea		Occurs							
Wild Raisin, Northern		Occurs	Occurs						
Winterberry	Occurs							Occurs	
Wood-fern, Crested	Occur								
Wood-fern, Intermediate	Occur								
Wood-fern, Spinulose	Occur								
Wood-sorrel, Mountain			Typical						

Char. = Characteristic
Co-dom = Co-dominant
Dom. = Dominant

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.)

HARDWOOD DOMINATED COMMUNITIES



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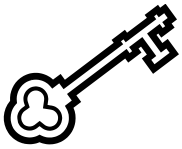
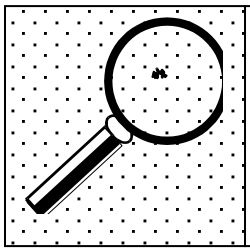


1. Canopy dominated by sycamore.	A. Yes – Cobble Bar Forest [a] B. No – Go to 2
2. Red maple dominant or co-dominant.	A. Yes – Go to 3 B. No – Go to 10
3. Red maple **dominant**, often accounting for >90% of canopy. Silver maple and black ash absent or nearly so.	A. Yes – Red Maple Swamp B. No – Go to 4
4. Red maple and silver maple co-dominant.	A. Yes – Go to 5 B. No – Go to 6
5. Canopy is a mixture of red and silver maple **and** mesic deciduous hardwoods. Green ash and/or swamp white oak absent. Ironwood typically present, forming open sub-canopy.	A. Yes – High Terrace Floodplain Forest B. No – Alluvial Red Maple Swamp
6. Red maple co-dominant with black ash.	A. Yes – Go to 7 B. No – Go to 8
7. Tamarack co-dominant.	A. Yes – Red Maple – Black Ash – Tamarack Calcareous Seep B. No – Go to 14
8. Red maple co-dominant with black gum (i.e., tupelo.)	A. Yes – Go to 9 B. No – Go to 13
9. Black gum, pin oak, and swamp white oak co-dominant.	A. Yes – Black Gum – Pin Oak – Swamp White Oak Perched Swamp B. No – Red Maple - Black Gum Swamp
10. Silver maple dominant.	A. Yes – Go to 11

Continued on next page

11. Cottonwood present, herb layer dominated by wood-nettles.	A. Yes – Major-river Floodplain Forest [a] B. No – Go to 12
12. Shrub layer present, typically with silky dogwood and/or buttonbush. Pin oak or river birch common canopy associate.	A. Yes – Small-river Floodplain Forest B. No – Transitional Floodplain Forest
13. Red Maple co dominant with black cherry, with a fairly open canopy cover.	A. Yes – Alluvial Hardwood Flat
14. Bur Oak co dominant with Red Maple and Black Ash	A. Yes – Red Maple – Black Ash – Bur Oak Swamp B. No – Red Maple – Black Ash Swamp

a. A variant of the Major-river Floodplain Forest has been reported along the Housatonic River. This variant includes a canopy with an even mix of sycamore, silver maple, cottonwood, and white ash. This variant is included in the community description, and listed separately in the "Plants Associated with…" table.



The easiest approach to identifying these communities is to determine if silver maple is present, and if it is dominant or co-dominant.

The amount of red maple, silver maple, and black ash will help you identify the correct community.

Descriptions of Hardwood Dominated Communities

Cobble Bar Forest S2

Description/Concept	A variant of high-energy riverbanks characterized by open forests dominated by sycamores and cottonwoods growing on sandy cobble bars. Accumulation of silts and other fine sediments along riverbanks in this community will change flood regimes and can cause the Cobble Bar Forest to succeed to other types of floodplain forest. Known distribution restricted to Connecticut River Valley and the Berkshires.
Topography	Flood and ice scoured river shores and islands in relatively low gradient sections of high energy rivers where the bank is low.
Soils/Substrate	**Cobble substrates** deposited by high-energy rivers.
Canopy	**Sycamore dominant**, with cottonwood and silver maple. Green ash and American elm often occur slightly inland.
Sub-canopy	
Shrub layer	Usually scattered invasive species including common privet, Japanese knotweed, Japanese barberry, multiflora rose, and bush honeysuckle are common in many examples of this community.
Herb layer	Diverse but sparse, with herbs occuring in sand/silt among cobbles. Sedges, deer-tongue grass, sensitive fern, horsetail and false Solomon's seal are typical. Grapes, Oriental bittersweet, Virginia creeper, and poison ivy can be dense and cover tree and shrub foliage and tie them into impenetrable masses.
Leaf litter	

[Decision Rules: H fl category = >50% silver maple and floodplain hardwoods, either singly or combined.]

Red Maple Swamp S5

Description/Concept	Acidic forested wetland with red maple dominant in the overstory. Most common forested wetlands in Massachusetts.
Topography	Many different physical settings. Three different basic types: Hillside seeps and upland drainageways fed primarily by groundwater seepage and overland flow; seasonally flooded basin swamps in undrained basins in till of stratified drift (or low-lying areas in outwash as on Cape Cod); and alluvial swamps on low-lying floodplains, oxbows, or river terraces (classified as Alluvial Red Maple Swamp Community)
Soils/Substrate	Shallow to thick organic layers overlying mineral sands/silts.
Canopy	**Red maple dominant (often >90% canopy cover).** Variable mixture of trees co-occur, including: yellow birch, black gum, white ash, white pine, American elm, hemlock, pin oak, and swamp white oak. Atlantic white cedar is a common co-occurring species in coastal communities; when AWC is dominant the community is classified as an Atlantic White Cedar Swamp.
Sub-canopy	
Shrub layer	Often dense and well developed, generally with >50% cover. Sweet pepper-bush and swamp azalea, often bound together by greenbriers, are the dominant shrubs in eastern Massachusetts. Other common shrubs include: highbush blueberry and common winterberry (often dominant); spicebush; northern arrow-wood; speckled alder;, nannyberry; and poison sumac.
Herb layer	Highly variable. Ferns usually abundant. Cinnamon fern common. Other ferns include: sensitive fern, royal fern, marsh fern, and spinulose wood-fern. Skunk cabbage and graminoids are also common.
Leaf litter	

[Decision Rule: Rm sw community = >75% red maple required in canopy.]

High-terrace Floodplain Forest S2

Description/Concept	Mesic, deciduous hardwood forest. High alluvial terraces above zone of annual flooding, also along high-gradient rivers. River influenced but not flooded annually. Disturbed areas are prone to invasive plant species.
Topography	Raised banks adjacent to rivers/streams; steep banks along high-gradient rivers, high alluvial terraces; and raised areas within major-river and small-river floodplain forests.
Soils/Substrate	Distinct surface, soil organic layer. Soils typically silt loams.
Canopy	Mixture of floodplain taxa and mesic, deciduous hardwoods. May include red, silver, and sugar maples, birches, hickories, ashes, butternut, sycamore, cottonwood, black cherry, basswood, and elms. Large hackberry has been found in one site.
Sub-canopy	**Typically, open sub-canopy of ironwood; this is a good indicator for this community.**
Shrub layer	Variable, from sparse to well-developed. Northern arrowwood, nannyberry, and winterberry most common native species; often mixed with barberry and buckthorns.
Herb layer	Mixture of characteristic floodplain forest plants - sensitive fern, ostrich fern, and wood-nettle and rich upland herbs, such as lady fern, zigzag goldenrod, white snakeroot, jack-in-the-pulpit, and bellwort. Other characteristic species include: honewort, bottlebrush grass, floodplain avens, jumpseed, Wiegand's wild rye, trilliums, trout-lily, and enchanter's nightshade. Grape, prickly cucumber, moonseed, Virginia creeper and poison ivy may also be abundant.
Leaf litter	

[Decision Rules: H fl category = >50% silver maple and floodplain hardwoods, either singly or combined.]

Alluvial Red Maple Swamp S3

Description/Concept	A richer variant of red maple swamps that occurs in low areas along rivers and streams that experience overbank flooding periodically. May occur as parts of wetland mosaics with other types of flooplain forests, shrub swamps, and other wetland communities. Groundwater from uplands and surrounding wetlands may maintain soil moisture over the growing season.
Topography	Low areas **along low gradient rivers and streams**.
Soils/Substrate	Typically silt loams with pronounced soil mottling and a surface organic layer.
Canopy	**Characterized by a mixture of red maple and silver maple.** American Em, sugar maple, green ash, shagbark hickory, and/or swamp white oak present in lesser amounts. Red oak, white pine and black cherry occur in elevated sections.
Sub-canopy	Canopy dominates along with hornbeam.
Shrub layer	Well-developed shrub layer. Northern arrow-wood, American hazelnut, buttonbush, meadowsweet, and silky dogwood. Coastal plains include mountain laurel, winterberry, and sweet pepper-bush.
Herb layer	Often dominated by sensitive fern and false nettle. Cinnamon fern, royal fern, golden rods, jewelweeds, beggar-ticks, bugleweeds, awned sedge, rice cutgrass, poison ivy, bluejoint grass and woodreed are common associates.
Leaf litter	

[Decision Rules: H fl category = >50% silver maple and floodplain hardwoods, either singly or combined.]

Red Maple – Black Ash – Tamarack Calcareous Seepage Swamp S2

Description/Concept	A **mixed deciduous-coniferous forested swamp**. Occurs in areas with calcareous groundwater seepage. Sometimes referred to as a forested fen. This community has a concentration of state-protected rare plants.
Topography	Hummocky.
Soils/Substrate	Mineral soils with a thin layer of peat accumulation.
Canopy	Variable mixture, with black ash, tamarack, and red maple common in the canopy. At lower elevations (<1,000 ft.), yellow birch, American elm, white pine, and eastern hemlock also occur. At high-elevations (>1,000 ft.) red spruce, balsam fir, and Canada yew also occur.
Sub-canopy	**Characterized by ironwood.**
Shrub layer	Species-rich, frequently dense, and characterized by calcium loving plants. **Characteristic species are poison sumac and alder-leaf buckthorn.** Speckled alder, gray dogwood, winterberry, spicebush, meadowsweet, and highbush blueberry also occur. Shrubby cinquefoil occurs in open areas.
Herb layer	Diverse, with many calcium-loving species. Characteristic species include delicate sedge, brome-like sedge, long-stalked sedge, rough-leaved goldenrod, and golden ragwort. Other typical species include skunk cabbage, sensitive fern, royal fern, jewelweed, and naked mitrewort.
Leaf litter	

[Decision Rules: RmGu sw category = >50% red maple and >25% associates (e.g., black gum, pin oak.)]

Black Gum – Pin Oak – Swamp White Oak Perched Swamp S1

Description/Concept	A red-maple dominated swamp in which black gum, pin oak, and swamp white oak are important components of the overstory. Wet at least seasonally, flooding in the spring and drying out over the summer. Periodic flooding occurs as indicated by the lack of organic accumulation. Notable for its high coverage of ferns. **Restricted to lakebed sediments of glacial lake Hitchcock in the Connecticut Valley**.
Topography	Basins with little or no slope. Microtopography is pronounced hummock-hollow.
Soils/Substrate	Lake bottom clays overlain by silt and sand.
Canopy	Generally closed, but ranges from 50-100% **Red maple dominant with southern tree species** (black gum, pin oak, and swamp white oak) **co-dominant.** Ashes, eastern hemlock, yellow birch are consistently present at low densities.
Sub-canopy	
Shrub layer	Fairly dense and similar to other red maple swamps. Common species include highbush blueberry, northern arrow-wood, common winterberry, witch hazel, and serviceberry, with spicebush or often buttonbush occurring at the wettest sites and mountain laurel found at the drier sites.
Herb layer	Variable, but cinnamon fern occurs at all known sites. Other common species include Canada mayflower, goldthread, Indian cucumber-root, and sedges.
Leaf litter	

[Decision Rules: RmGu sw category = >50% red maple and >25% associates (e.g., black gum, pin oak.)]

Major-river Floodplain Forest S2

Description/Concept	Silver maple dominated forests of alluvial floodplains along the Connecticut, Deerfield, and Housatonic rivers. Subject to severe annual flooding and alluvial silt deposition. A variant of this community is associated with the elevated section of riverine islands and riverbanks of major rivers that have been subjected to natural and human disturbance.
Topography	Along mainstream sections of large rivers.
Soils/Substrate	Predominantly sandy loams without soil mottles and without a surface organic layer.
Canopy	**Silver maple is strongly dominant**, usually >60% cover, **mixed with lesser amounts of cottonwood.** *ISLAND VARIANT:* Lacks dominant silver maple; instead, there is an even mix of silver maple, cottonwood, sycamore, and white ash.
Sub-canopy	**American elm and/or slippery elm**. *ISLAND VARIANT:* Box elder and hackberry occur.
Shrub layer	*ISLAND VARIANT:* Has species associated with disturbed areas, such as staghorn sumac and bittersweet.
Herb layer	Usually dominated by 3-6 ft. layer of dense wood-nettles. Ostrich fern sometimes abundant. White cut-grass is consistently represented in low amounts, typically <5% cover. Common associates include woodreed and jack-in-the-pulpit. *ISLAND VARIANT*: Has herb layer strongly dominated by ostrich fern, with riverbank grape and Virginia creeper common.
Leaf litter	

[Decision Rules: H fl category = >50% silver maple and floodplain hardwoods, either singly or combined.]

Small-river Floodplain Forest S2

Description/Concept	Silver maple/green ash dominated forests occurring on alluvial soils of small rivers and streams.
Topography	Along small rivers/tributaries of the Connecticut, Housatonic and Nashua Rivers where the banks are low and over bank flooding occurs annually. Patches can occur in poorly-drained depressions within the level floodplain of other types of floodplain forests.
Soils/Substrate	Hydric silt loams, and fine sandy loams with soil mottling in top 2 ft. A surface organic layer is sometimes present.
Canopy	**Silver maple is dominant**, with green ash often associating with it**.** American or slippery elm, swamp white oak and red maple often occur in low numbers. Pin Oak and river birch are typical associates in the Connecticut River basin and Merrimack River basin respectively.
Sub-canopy	Green ash can be present.
Shrub layer	Mainly consists of silky dogwood and buttonbush.
Herb layer	Greater diversity than in Major-river and Transitional communities. Sensitive fern and false nettle are most common. Water-hemlock, swamp-candles, and water parsnip occur.
Leaf litter	

[Decision Rules: H fl category = >50% silver maple and floodplain hardwoods, either singly or combined.]

Transitional Floodplain Forest S2

Description/Concept	This community is intermediate in vegetation composition and soils between major- and small-river floodplain forests. **A silver maple - green ash – American elm forest** occurring on alluvial soils. Known to occur on third order and smaller tributaries of the Connecticut River, on portions of the Housatonic River, and in depressions within Major-river Floodplain Forests of the Connecticut and Deerfield Rivers. Generally experience annual flooding intermediate between major-river and small-river floodplain forests.
Topography	Floodplains and depressions.
Soils/Substrate	Silt loams or very fine sandy loams with soil mottling present within 2 ft. of surface. Surface organic layer is typically absent.
Canopy	**Silver maple is dominant.** Cottonwood is typically absent. Green ash and American elm are present.
Sub-canopy	Green ash and American elm are present.
Shrub layer	Generally lacking, but saplings of canopy trees are common. Vines are abundant, with hog peanut most common and poison ivy regularly present. Wood-nettle present in low amounts, about 5-15% cover.
Herb layer	Typically an even mixture of wood-nettle, false nettle, and ostrich and sensitive ferns. Gray's sedge, cat-tail sedge and Green Dragon are occasional associates.
Leaf litter	

[Decision Rules: H fl category = >50% silver maple and floodplain hardwoods, either singly or combined.]

Red Maple – Black Gum Swamp S2

Description/Concept	Small patch deciduous swamp forests characterized by abundant black gum in the canopy. Forested acidic basin swamps with accumulations of peat. **Contain very old (300 to >500) year old black gum trees.** Generally saturated and/or seasonally flooded.
Topography	Depressions at about 1000ft, perched on hillside benches or concavities. Usually no defined inlet and a small intermittent outlet channel, while isolated from perennial streams.
Soils/Substrate	Glacial till soils; acidic, nutrient poor peak or muck hummocks and hollows.
Canopy	**Black gum is dominant or codominant with red maple in the canopy**. Canopy is generally open (25-50% coverage). Eastern hemlock, yellow birch, white pine, red spruce, and black ash are often associates.
Sub-canopy	
Shrub layer	Well-developed, but variable shrub layer. Highbush blueberry, common and smooth winterberry, common mountain-holly, mountain-laurel, and wild raisin are common.
Herb layer	Not generally diverse. Cinnamon fern is usually the most abundant species. Royal fern, marsh-fern, Massachusetts fern, beggar-ticks, goldthread, northern water-horehound, swamp-dewberry, and marsh St. John's-wort are also present. Wet hollows are typically lined with silvery bog-sedge, bladder-sedge, tussock-sedge and three-seeded bog sedge.
Leaf litter	

Alluvial Hardwood Flat S3

Description/Concept	Fairly open hardwood forests on alluvial flats along small rivers and large streams. Flooding occurs but is short and intense due to the small watersheds responding rapidly to local weather events.
Topography	Alluvial flats, along moderate gradient reaches of small rivers and large streams.
Soils/Substrate	Coarse sand and gravel, with mesic to locally hydric moisture regimes.
Canopy	Sparse to closed. Black cherry is co dominant with red maple, with scattered American elm, white ash, sugar maple, and white pine. White pines substantially taller than the hardwood canopy are sparsely emergent above the canopy.
Sub-canopy	Saplings of the tree species, along with ironwood, smooth shadbush, alternate-leaved dogwood, witch hazel and blackberry.
Shrub layer	Wide variety are present, but never at high density. Tree species absent from the canopy like red oak, paper birch, and eastern hemlock are common in the shrub layer.
Herb layer	Dense and species-rich, but structure varies from stand to stand and is often patchy within stand. Woodgrass and New York fern are two characteristic species normally present and often with substantial cover in dominance patches. Jack-in-the-pulpit, lady fern, sensitive fern, interrupted fern, bristly dewberry and tall meadow-rue are also common.
Leaf litter	

Red Maple – Black Ash Swamp S2

Description/Concept	A rich variant of red maple swamps where black ash is abundant in the canopy. Associated with circumneutral groundwater seepage. Relatively wet with seasonal inundation in depressions at or near the headwaters of streams.
Topography	Hummock-hollow. Occassionally occur on sloping edges of river floodplains adjacent to upland slopes where seepage input occurs as small seepy pockets within larger red maple swamp matrices.
Soils/Substrate	
Canopy	**Red maple and black ash are prominent in the canopy.** Black ash trees do not usually grow very large. Yellow birch, white pine and hemlock are common associates.
Sub-canopy	Black ash is much more abundant here than in the canopy. American elm is also characteristic, along with younger canopy trees.
Shrub layer	High diversity but variable in cover. Winterberry is the most characteristic. Common associates include highbush blueberry, poison-sumac, speckled alder, and spicebush. Occasional shrubs include witch hazel, silky dogwood, northern arrow-wood, mountain holly and most saplings from the canopy tree species
Herb layer	Cinnamon fern and skunk cabbage are usually the most abundant. Royal fern, marsh-fern, sensitive fern, swamp saxifrage, golden ragwort, foamflower, golden saxifrage, jewelweed, jack-in-the-pulpit, water avens, goldthread, tussock sedge and fowl meadow-grass are common associates. Sphagnum moss is also common and occasionally dense on hummocks.
Leaf litter	

Red Maple – Black Ash – Bur Oak Swamp S2

Description/Concept	Deciduous swamp forest occurring in areas with somewhat enriched circumneutral groundwater. Occurs only in western Massachusetts where somewhat nutrient enriched circumneutral, but not calcareous, groundwater occurs within the eastern edge of the range of Bur Oak. Sediments are saturated throughout the year, but generally the hollows are dried to bare surfaces in the late summer. Canopy generally closed at 60ft or higher.
Topography	Hummock-hollow.
Soils/Substrate	A mucky mix of mineral and organic, silt and sandy loams
Canopy	Variable mixture of deciduous and occasionally coniferous trees. Red maple, black ash and bur oak are the most common. Swamp white oak and white oaks are present and hybridize with bur oak. Green ash, slippery and American elms, sugar maple, yellow birch, eastern hemlock, tamarack and white pine are common associates, but conifers are generally scattered.
Sub-canopy	Similar to canopy, but often dominated by the black ash.
Shrub layer	Generally patchy with highbush blueberry, winterberry, hornbeam, and black ash, with witch-hazel and spicebush near the edges.
Herb layer	Variable and moderately diverse. Dominated by tussock sedge and skunk cabbage. Common associates are common horsetail, awned sedge, sensitive fern, cinnamon fern, royal fern, foamflower, goldthread, marsh marigold, and northern blue flag. Poison sumac is uncommon.
Leaf litter	

Plants Associated with Hardwood Dominated Communities
Part 1. Communities <u>always</u> associated with rivers and floodplains

	Cobble Bar Forest	High-terrace Floodplain Forest	Alluvial Red Maple Swamp	Major River Floodplain Forest	Transitional Floodplain Forest	Small-river Floodplain Forest	Alluvial Hardwood Flat
Arrow-wood, Northern		Occurs	Occurs				
Ash, American							
Ash, Green			Occurs		Occurs		
Ash, White							Occurs
Avens, Floodplain		Char.					
Barberry, Japanese		Occurs					
Basswood		Occurs					
Bellwort		Occurs					
Birch, River						Common	
Bittersweet, Oriental	Occurs						
Boxelder							
Buckthorn		Occurs					
Buckthorn, European			Occurs				
Bugleweeds			Common				
Buttonbush						Common	
Cherry, Black		Occurs	Occurs				Dominant
Cottonwood	Common			Occurs	Absent	Absent	
Dogwood, Silky			Occurs			Common	
Elm, American	Occurs	Occurs		Occurs	Occurs		Occurs
Elm, Slippery				Occurs			
Fern, Lady		Occurs					Common
Fern, New York							Char.
Fern, Ostrich		Occurs		Occurs	Occurs		
Fern, Royal			Common				
Fern, Sensitive	Typical		Dominant		Occurs	Common	Common
Goldenrod, Zigzag		Occurs					
Grape, River-bank							
Grass, Bottlebrush		Char.					
Grass, White				Occurs			
Hackberry							
Hickory, Shagbark		Occurs					
Honewort		Char.					
Honeysuckle	Occurs						
Horsetail	Typical						
Ironwood		Indicator					
Jack-in-the-pulpit		Occurs		Common			
Jumpseed		Char.					
Knotweed, Japanese	Occurs						

Plants Associated with Hardwood Dominated Communities
Part 1. Communities <u>always</u> associated with rivers and floodplains (continued)

	Cobble Bar Forest	High-terrace Floodplain Forest	Alluvial Red Maple Swamp	Major-river Floodplain Forest	Transitional Floodplain Forest	Small-river Floodplain Forest	Alluvial Hardwood Flat
Maple, Red		Occurs	Co-dom.			Absent	Dominant
Maple, Silver	Common	Occurs	Co-dom.	Dominant	Dominant	Dominant	
Maple, Sugar		Occurs					Occurs
Mayflower, Canada		Occurs					
Nannyberry		Occurs					
Nettle, False			Dominant		Occurs	Common	
Nightshade, Enchanter's		Char.					
Oak, Northern Red			Occurs				
Oak, Pin						Occurs	
Oak, Swamp White			Occurs				
Peanut, Hog					Common		
Pine, White			Occurs				Occurs
Poison Ivy	Occurs	Occurs					
Rose, Multi-flora	Occurs						
Sedge, Awned			Common				
Snakeroot, White		Occurs					
Solomon's Seal, False	Typical						
Sumac, Staghorn							
Swamp-Candles						Occurs	
Sycamore	Dominant						
Trillium		Char.					
Trout-lily		Char.					
Virginia Creeper	Occurs	Occurs					
Water Hemlock						Occurs	
Water Parsnip						Occurs	
Wild Rye, Weigand's		Char.					
Woodgrass							Char.
Wood-nettle				Dominant	Occurs		
Woodreed				Common			

Char. = Characteristic
Co-dom = Co-dominant

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 Hardwood Dominated Communities
Part 2. Communities not associated with rivers and floodplains

	Red Maple Swamp	Black Ash – Red Maple – Tamarack Calcareous Seep	Red Maple – Black Ash Swamp	Black Gum – Pin Oak – Swamp White Oak Perched Swamp	Red Maple – Black Gum Swamp	Red Maple – Black Ash – Bur Oak Swamp
Alder, Speckled	Occurs	Occurs				
Arrow-wood, Northern	Occurs		Common	Common		
Ash, Black		Common	Co-dominant		Common	Common
Ash, White	Occurs					
Azalea, Swamp	Dominant					
Beggar-ticks					Occurs	
Birch, Yellow	Occurs	Occurs	Occurs		Common	Occurs
Blueberry, Highbush	Occurs	Occurs	Common	Common	Occurs	Common
Bog-sedge, Silvery					Occurs	
Bog-sedge, Three-seeded					Occurs	
Buckthorn, Alder-leaf		Char.				
Bugleweeds	Common					
Cedar, Atlantic White	Occurs					
Cinquefoil, Shrubby		Occurs				
Dewberry, Swamp	Common				Occurs	
Dogwood, Gray		Occurs				
Elm, American	Occurs	Occurs				
Fern, Cinnamon	Common		Common	Common	Occurs	Common
Fern, Lady			Occurs			
Fern, Marsh	Occurs					
Fern, Massachusetts					Occurs	Common
Fern, Royal	Occurs	Typical	Occurs			
Fern, Sensitive	Occurs	Typical	Occurs			Common
Fir, Balsam		Occurs				
Goldenrod, Rough-leaved		Occurs				
Goldthread				Common	Occurs	Common
Gum, Black	Occurs			Co-dominant	Dominant	
Hellebore, False	Common					
Hemlock, Eastern	Occurs	Occurs	Occurs	Common	Abundant	Occurs
Indian Cucumber-root				Common		
Ironwood		Char.				
Jack-in-the-pulpit			Occurs			
Jewelweed		Typical	Occurs			
Laurel, Mountain					Occurs	
Maple, Red	Dominant	Common	Co-dominant	Dominant	Abundant	Common
Maple, Sugar			Occurs			Occurs
Marigold, Marsh	Common					Common
Mayflower, Canada				Common		

Plants Associated with Hardwood Dominated Communities
Part 2. Communities not associated with rivers and floodplains (continued)

	Red Maple Swamp	Red Maple – Black Ash –Tamarack Calcareous Seep	Red Maple - Black Ash Swamp	Black Gum – Pin Oak – Swamp White Oak Perched Swamp	Red Maple - Black Gum Swamp	Red Maple – Black Ash – Bur Oak Swamp
Meadowsweet		Occurs				
Mitrewort, Naked		Occurs				
Mountain-holly, Common			Occurs		Occurs	
Nannyberry	Occurs					
Oak, Bur		Occurs				Common
Oak, Pin	Occurs			Co-dominant		
Oak, Swamp White	Occurs			Co-dominant		Occurs
Pepper-bush, Sweet	Dominant					
Pine, White	Occurs	Occurs	Occurs		Common	Occurs
Ragwort, Golden		Occurs				
Saxifrage, Swamp			Occurs			
Sedge				Common		Common
Sedge, Bladder-					Occurs	
Sedge, Brome-like		Occurs				
Sedge, Delicate		Occurs				
Sedge, Long-stalked		Occurs				
Sedge, Tussock-			Occurs		Occurs	Dominant
Serviceberry				Common		
Skunk Cabbage	Common	Typical	Common			
Sphagnum			Common			
Spicebush		Occurs	Common			
Spruce, Red		Occurs				
St. John's-wort, Marsh					Occurs	
Sumac, Poison	Occurs	Char.				
Tamarack		Common				Occurs
Touch-me-not, Spotted	Common					
Water-Horehound, Northern					Occurs	
Wild Raisin					Occurs	
Winterberry, Common	Occurs	Occurs	Common	Common	Occurs	Common
Winterberry, Smooth					Occurs	
Witch Hazel			Occurs			Common
Wood-Fern, Spinulose	Occurs					
Yew, Canada		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.)

Hierarchical classification of natural communities within the Palustrine System

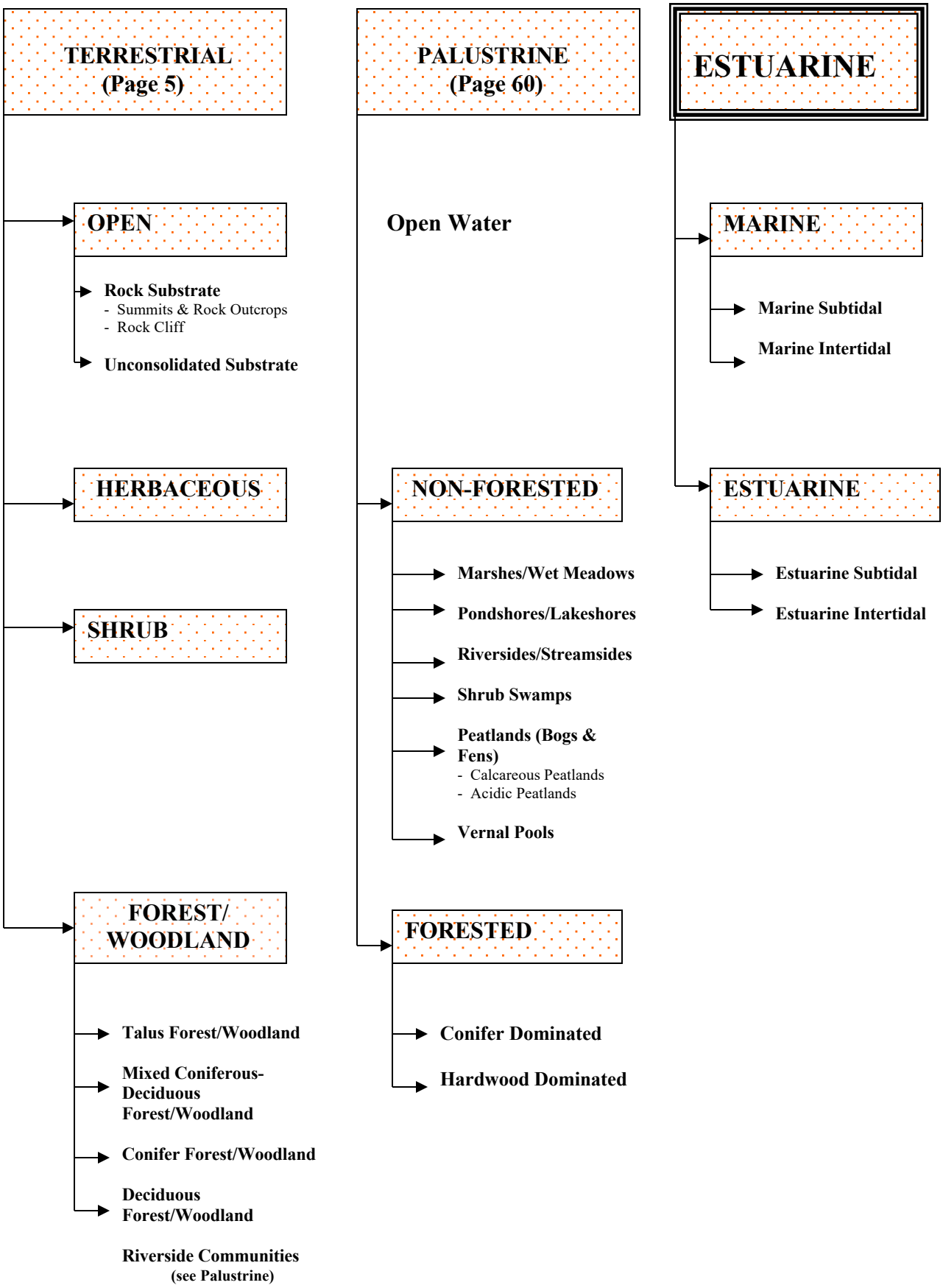
Sub-System	Community Group	Community Sub-group	Community Type
Non-Forested	Marshes/Wet Meadows	N/A	Interdunal Marsh/Swale
			Deep Emergent Marsh
			Shallow Emergent Marsh
			Wet Meadow
			Kettlehole Wet Meadow
	Pondshores/Lakeshores	N/A	Calcareous Pondshore/Lakeshore
			Acidic Pondshore/Lakeshore
			Coastal Plain Pondshore
			Coastal Plain Pondshore – Inland Variant
			River and Lake Drawdown
	Riversides/Streamsides	N/A	Riverside Seep
			High-energy Riverbank
			Low-energy Riverbank
			Riverine Pointbar and Beach
			Freshwater Mud Flat
			High-energy Rivershore Meadow
	Shrub Swamps	N/A	Shrub Swamp
	Peatlands (Bogs & Fens)	Calcareous Peatlands	Calcareous Basin Fen
			Calcareous Sloping Fen
			Calcareous Seepage Marsh

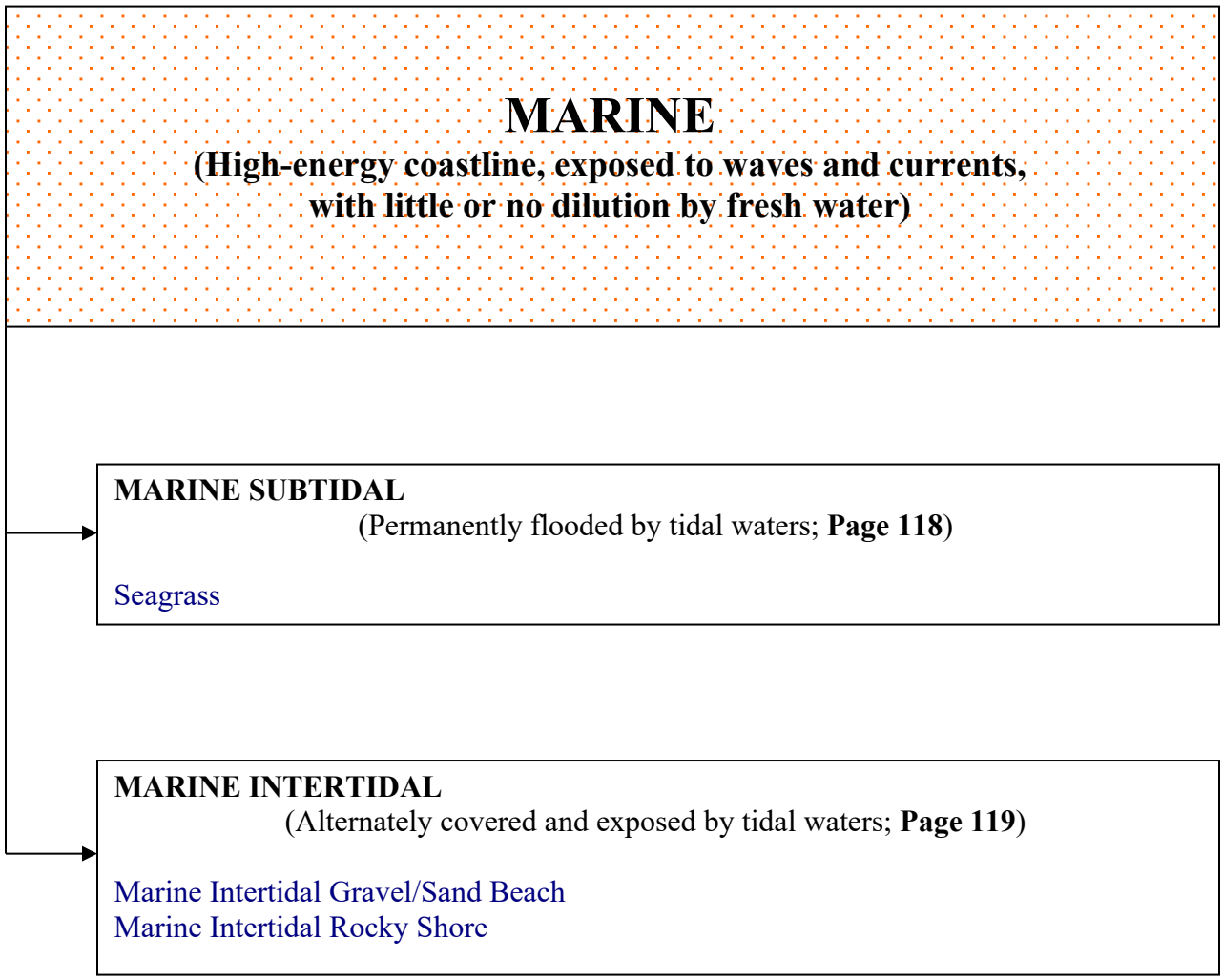
Hierarchical classification of natural communities within the Palustrine System

Sub-System	Community Group	Community Sub-group	Community Type
Non-Forested (continued)		xxxxx	Sea-Level Fen Acidic Graminoid Fen Acidic Shrub Fen Highbush Blueberry Thicket Level Bog Kettlehole Level Bog Acidic Graminoid Fen - Spillway Fen

Hierarchical classification of natural communities within the Palustrine System

Sub-System	Community Group	Community Sub-group	Community Type
Forested	Conifer Dominated	N/A	Hemlock Swamp Spruce – Tamarack Bod Atlantic White Cedar Bog Alluvial Atlantic White Cedar Swamp Northern Atlantic White Cedar Swamp Coastal Atlantic White Cedar Swamp Inland Atlantic White Cedar Swamp Red Spruce Swamp Rich Conifer Swamp
	Hardwood Dominated	NA	Cobble Bar Forest Red Maple Swamp High-terrace Floodplain Forest Alluvial Red Maple Swamp Red Maple – Black Ash – Tamarack Calcareous Seepage Swamp Black Gum – Pin Oak – Swamp White Oak Perched Swamp Major-river Floodplain Forest Small-river Floodplain Forest Transitional Floodplain Forest Red Maple – Black Gum Swamp Alluvial Hardwood Flat Red Maple – Black Ash Swamp Red Maple – Black Ash – Bur Oak Swamp


TERRESTRIAL
(Page 5)
PALUSTRINE
(Page 60)
ESTUARINE
OPEN
Rock Substrate
- Summits & Rock Outcrops
- Rock Cliff
Unconsolidated Substrate
HERBACEOUS
SHRUB
FOREST/
WOODLAND
Talus Forest/Woodland
Mixed Coniferous-
Deciduous
Forest/Woodland
Conifer Forest/Woodland
Deciduous
Forest/Woodland
Riverside Communities
(see Palustrine)
Open Water
NON-FORESTED
Marshes/Wet Meadows
Pondshores/Lakeshores
Riversides/Streamsides
Shrub Swamps
Peatlands (Bogs &
Fens)
- Calcareous Peatlands
- Acidic Peatlands
Vernal Pools
FORESTED
Conifer Dominated
Hardwood Dominated
MARINE
Marine Subtidal
Marine Intertidal
ESTUARINE
Estuarine Subtidal
Estuarine Intertidal


MARINE
(High-energy coastline, exposed to waves and currents, with little or no dilution by fresh water)
MARINE SUBTIDAL
(Permanently flooded by tidal waters; Page 118)
Seagrass
MARINE INTERTIDAL
(Alternately covered and exposed by tidal waters; Page 119)
Marine Intertidal Gravel/Sand Beach
Marine Intertidal Rocky Shore

ESTUARINE

(Ocean water diluted by freshwater, includes mouth of a river, bay, or sound, and areas up river)

ESTUARINE SUBTIDAL

(Permanently flooded by tidal waters; **Page 121**)

Coastal Salt Pond

ESTUARINE INTERTIDAL

(Alternately covered and exposed by tidal waters; **Page 122**)

Salt Marsh
Brackish Tidal Marsh
Freshwater Tidal Marsh
Fresh/Brackish Tidal Shrubland
Fresh/Brackish Tidal Swamp

MARINE SUBTIDAL COMMUNITIES

Description of Marine Subtidal Communities

Seagrass **S3**

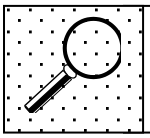
Description/Concept	Estuarine or marine, sparsely to densely vegetated communities with a strong invertebrate component. Completely submerged at high tide. Includes beds of tidal creeks draining salt marshes and river mouths. Species composition depends on salinity, water temperature, depth and substrate type. Regularly disturbed by currents and tides, storms and winter ice moving and redpositing sediments and changing areas inhabited by flora and fauna.
Topography	Permanently submerged saline to brackish, subtidal to intertidal sand/mud flats.
Soils/Substrate	
Canopy	
Sub-canopy	
Shrub layer	
Herb layer	Sparsely to densely vegetated dominated by eelgrass and widgeon grass, which may be in dense beds. Waterweed, coontail, sago pondweed and horned pondweed may be mixed in or form locally dense beds. Algae may form mats on the surface. Seas lettuce and red algae can be locally dense. Wild rice is restricted to brackish waters. River arrowhead, Parker's Pipewort, and Long's Bitter-cress grow in fresh/brackish tidal flats. More saline waters include quillwort and saltpond spike-rush.
Leaf litter	

NOTE: **Because there is only one Marine Subtidal community type, there is no key provided.**

MARINE INTERTIDAL COMMUNITIES

Shortcut Key: Check full descriptions following use of key

1. Community characterized by a rocky substrate.	A. Yes – Rocky Shore B. No – Go to 2
2. Community characterized by a substrate of sand and/or gravel. silt, and clay.	A. Yes – Gravel/Sand Beach



These communities separate on the basis of substrate.

Descriptions of Marine Intertidal Communities

Marine Intertidal Gravel/Sand Beach S4

Description/Concept	A highly stressed community in the intertidal (i.e., wave action) zone of beaches. Area exposed between high tides. Dominated by invertebrates and non-vascular plants. Often interspersed with low areas that contain intertidal pools. High energy habitats.
Topography	Located below wrack line and above the permanent water.
Soils/Substrate	Gravel/sand.
Canopy	
Sub-canopy	
Shrub layer	
Herb layer	Sparse non-vascular plants.
Leaf litter	

Marine Intertidal Rocky Shore S4

Description/Concept	A high stress community dominated by invertebrates and non-vascular plants. Community grades into rocky subtidal community on the ocean side and Maritime Rock Cliff Community toward the upland above the tidal zone. Alternately covered by tides and exposed to desiccation and thermal stress. Winter storms that directly remove organisms are the largest natural disturbances. In the absence of physical removal, competition for space on rocks determines the types of species that dominate. Distinct zonation from the splash zone to the zone of complete inundation.
Topography	Along rocky shores, from the supratidal splash zone to the limits of light penetration in the subtidal zone.
Soils/Substrate	Rocks ranging from huge boulders and bedrock to cobbles.
Canopy	
Sub-canopy	
Shrub layer	
Herb layer	Dominated by marine algae, especially bladder wrack and rockweed on mid tidal rock faces. In low intertidal pools Irish moss and encrusting red algae are common. Sea-lettuce is common throughout.
Leaf litter	

Descriptions of Estuarine Subtidal Communities

Coastal Salt Pond **S2**

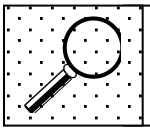
Description/Concept	Vegetation in and surrounding coastal saline to brackish ponds with shallow water. Inland end tends to be fresher, with denser, taller vegetation. Found on the south and east sides of Cape Cod, and along Buzzard's Bay. Water levels fluctuate in closed salt ponds. Shorelines support marsh areas similar to brackish salt marshes.
Topography	Isolated from the ocean (more or less) by sand spits that cut off a bay. Spits may become broken by storms or human intervention, and may reclose by drifting sand.
Soils/Substrate	Mud and sand (in part.)
Canopy	
Sub-canopy	
Shrub layer	
Herb layer	Eelgrass beds often dominate sub-tidal areas of community. Mud or sand shores support mud flat species such as: mudwort, dwarf spike-rush, seaside flatsedge, seaside crowfoot, false pimpernel, waterwort, and shore pygmy-weed. Inland ends (i.e., less brackish end) is similar to landward, brackish, portions of other salt marshes, with beds of narrow-leaved cat-tail, common reed, freshwater cord-grass, saltmarsh switchgrass, bulrushes, and mock bishop's-weed.
Leaf litter	

NOTE: **Because there is only one Estuarine Subtidal community type, there is no key provided.**

ESTUARINE INTERTIDAL COMMUNITIES

Shortcut Key: Check full descriptions following use of key

1. Community is an open <u>shrubland</u> along a coastal river.	A. Yes – Fresh/Brackish Tidal Shrubland B. No – Go to 2
2. Community is a low stature <u>forested wetland</u> along a coastal river.	A. Yes – Fresh/Brackish Tidal Swamp B. No – Go to 3
3. Herbaceous community dominated by freshwater species such as bluejoint, jewelweed, climbing hempweed, wild rice, tear thumb, and smartweed. Buttonbush and silky dogwood occasionally present. Narrow-leaved cat-tail also dominant (but may characterize other communities as well.)	A. Yes – Freshwater Tidal Marsh B. No – Go to 4
4. Herbaceous community with high marsh dominated by salt-marsh hay.	A. Yes – Salt Marsh B. No – Go to 5
5. Herbaceous community with freshwater cord-grass and saltmarsh bulrush along banks, narrow-leaved cat-tail dominant in back marsh.	A. Yes – Brackish Tidal Marsh



Many of these communities are separated on the basis of salinity, which makes identification challenging in the field.

Descriptions of Estuarine Intertidal Communities

Salt Marsh S3

Description/Concept	A graminoid dominated, tidally flooded coastal community with several zones. Zones include low marsh, high marsh, salt shrub, and salt panne. Form in areas subject to tides, but sheltered from wave energy. Upper edges may be brackish where freshwater surface runoff enters from the upland.
Topography	Usually occur in estuaries and behind barrier beaches and spits.
Soils/Substrate	Peat develops in the higher marshes.
Canopy	
Sub-canopy	
Shrub layer	Upper edges can have groundsel-tree and saltmarsh elder.
Herb layer	**Low marsh** (between low and mean high tide) **dominated by saltwater cord-grass**. **High marsh** (between mean high tide and spring high tide) **dominated by salt-hay**. Spike grass usually also occurs in high marsh. Upland edge commonly has black grass. Mixed throughout are sea-lavender and seaside goldenrod. The freshest edges contain salt marsh switch grass. Poorly drained, salty areas can have populations of glasswort.
Leaf litter	Peat develops in the higher marshes.

[Decision Rules: A salt marsh category (SM) is recognized, but not described.]

Brackish Tidal Marsh S2

Description/Concept	Mixed herbaceous marsh flooded daily by tides. Community may be structurally diverse, including high and low marsh, and mud flats. Tidal amplitude 0-150 cm (comparable to Freshwater Tidal Marshes.) Average annual salinity 5-18 ppt.
Topography	Brackish reach of (free flowing) coastal rivers. May also occur in smaller patches of upper zones of Coastal Salt Marshes and Salt Ponds, usually near seepages or freshwater transition areas. Occasional occurrences along rocky shores, seepages, and ditches.
Soils/Substrate	
Canopy	
Sub-canopy	
Shrub layer	
Herb layer	**Narrow-leaved cat-tail is typically dominant** in backmarsh, with frequent stands of common reed, and less frequent stands of North American reed. Along the banks, freshwater cord-grass and saltmarsh bulrush occur; associated with switchgrass, seaside-goldenrod, rose-mallow, saltmarsh sedge and bentgrass. Low marsh supports stands of saltmarsh cordgrass and threesquare. Mudflats and shores support sparse low herbs such as Saltmarsh-fleabane, water pimpernel, mud lily and creeping spearwort. Plants of freshwater tidal marshes occasionally occur in the higher zones.
Leaf litter	

Freshwater Tidal Marsh S1

Description/Concept	Mixed **herbaceous marsh flooded daily by tides**, and occurring **in the <u>freshwater</u>** reach of coastal rivers. Community may be structurally diverse, including high marsh, low marsh, mud flats, rocky shore, ditches, and seepages. Tidal amplitude 0-150 cm (comparable to Brackish Tidal Marshes.) Average annual salinity <0.5 ppt. This community occurs upstream of brackish tidal marshes.
Topography	Freshwater reach of (free-flowing) coastal rivers.
Soils/Substrate	Variable. Sand, rocky and mud are all present.
Canopy	
Sub-canopy	
Shrub layer	Buttonbush and silky dogwood occasionally present.
Herb layer	Characterized by salt intolerant species. Blue joint, sedges, narrow-leaved cattail, wild rice, smartweeds and tearthumbs, false pimpernel, jewelweed, climbing hempweed and sweet flag are dominant. Low marsh typically supports stand-forming emergent plants like wild rice, sweet flag, soft-stem bulrush, grass-leaf arrowhead, pickerel-weed and water dock. Rockier substrates include freshwater cord-grass, three-square and water hemp. Sparsely vegetated mud flats include spike sedges, water purslane, water starwort and bittercress. Rocky shore include creeping spearwort and estuary beggar-ticks.
Leaf litter	

Fresh/Brackish Tidal Shrubland S1

Description/Concept	Dense to open **shrubland flooded by daily tides**, occurring along freshwater to brackish reach of coastal rivers. There is a great deal of micro-relief (tussocks and hollows) leading to high species diversity. Tidal fresh, or slightly brackish shrubland. Annual average salinity of <0.5 ppt.
Topography	Located in transition between freshwater tidal marshes and freshwater tidal swamps. Patches may also be throughout freshwater tidal marshes.
Soils/Substrate	Usually mineral without significant peat deposits.
Canopy	
Sub-canopy	
Shrub layer	Dominated by sweet gale and smooth alder, with some speckled alder. Some examples have mixture of shrubs such as silky dogwood, swamp-rose, winterberry, common elderberry, willow, buttonbush, and poison ivy. More northern examples may contain arrow-wood and meadowsweet.
Herb layer	Herbaceous associates include royal fern, marsh fern, bedstraws, common cat-tail, arrow-arum, New York aster, false nettle, touch-me-not, and swamp milkweed. Tussock sedge may be present in northern examples.
Leaf litter	

Fresh/Brackish Tidal Swamp S1

Description/Concept	Low stature **forested wetland located along coastal rivers**. At upper limit of tidal influence, and flooded daily by tides. This community represents an ecotone from tidal marsh to more typical non-tidal forested wetlands. Tidal amplitude may range from 0 - 40 cm (0 - 16 inches.) Average annual salinity from 0.5 ppt in freshwater areas, with gradients to 5-18 ppt.
Topography	Along free-flowing coastal rivers. A variation of this community occurs along smaller streams at the upper limit of tidal influence.
Soils/Substrate	
Canopy	Open forest canopy. Swamp white oak, Atlantic white cedar, red maple, and occasionally green ash and/or American elm occur on elevated hummocks.
Sub-canopy	
Shrub layer	Often very dense. Typically includes northern arrow-wood, winterberry holly, hornbeam, and silky dogwood.
Herb layer	Common Greenbrier, poison ivy and grapes weave through the shrub layer. Large mucky hollows flooded by daily tides support a diverse assemblage of herbs and graminoids. Typical species include jewelweed, sensitive fern and wild rice.
Leaf litter	

Plants Associated with Estuarine Intertidal Communities

	Salt Marsh	Brackish Tidal Marsh	Freshwater Tidal Marsh	Fresh/ Brackish Tidal Shrubland	Fresh/ Brackish Tidal Swamp
Alder, Smooth				Dominant	
Alder, Speckled				Occurs	
Algae					
Arrow-arum				Occurs	
Arrowhead, Grass-leaf					
Arrowhead, River					
Arrowhead, Sessile-fruited					
Arrow-wood, Northern				Occurs	Typical
Aster, New York				Occurs	
Bedstraw				Occurs	
Beggar-tick					
Bentgrass, Saltmarsh		Occurs			
Bishop's-weed, Mock					
Bluejoint			Dominant		
Bulrush					
Bulrush, Saltmarsh		Occurs			
Bulrush, Threesquare		Occurs			
Buttonbush			Occasional	Occurs	
Cat-tail, Broad-leaved				Occurs	
Cat-tail, Narrow-leaved		Dominant	Dominant		
Cord-grass, Freshwater		Occurs			
Cord-grass, Saltmarsh	Dominant	Occurs			
Dogwood, Silky			Occasional	Occurs	Typical
Eelgrass					
Elder, Salt Marsh	Occurs				
Elderberry, Common				Occurs	
Fern, Marsh				Occurs	
Fern, Royal				Occurs	
Fern, Sensitive					Occurs
Gale, Sweet				Dominant	
Glasswort	Occurs				
Goldenrod, Seaside	Occurs				
Grass, Black	Occurs				
Grass, Spike	Occurs				
Groundsel Tree	Occurs				
Hay, Salt Marsh	Dominant				
Hempweed, Climbing			Dominant		
Jewelweed			Dominant		Occurs
Lily, Mud		Occurs			

Plants Associated with Estuarine Intertidal Communities (continued)

	Salt Marsh	Brackish Tidal Marsh	Freshwater Tidal Marsh	Fresh/ Brackish Tidal Shrubland	Fresh/ Brackish Tidal Swamp
Maple, Red					Occurs
Meadowsweet				Occurs	
Milkweed, Swamp				Occurs	
Mudwort, Atlantic					
Nettle, False				Occurs	
Oak, Swamp White					Occurs
Pimpernel, False					
Pimpernel, Water		Occurs			
Poison Ivy				Occurs	
Quillwort, Riverbank					
Reed, Common		Occurs			
Rice, Wild			Dominant		Occurs
Rose, Swamp				Occurs	
Saltwort	Occurs				
Sea-lavender	Occurs				
Sedge			Dominant		
Sedge, Saltmarsh		Occurs			
Sedge, Tussock				Occurs	
Smartweed			Dominant		
Spearwort, Creeping		Occurs			
Spike-rush, Saltpond					
Sweet Flag			Dominant		
Switchgrass, Coastal					
Tearthumb			Dominant		
Touch-me-not				Occurs	
Willow				Occurs	
Winterberry				Occurs	Typical

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 Estuarine System

Sub-System	Community Group	Community Sub-group	Community Type
Marine	Marine Subtidal	N/A	Seagrass
	Marine Intertidal	N/A	Marine Intertidal Gravel/Sand Beach Marine Intertidal Rocky Shore
Estuarine	Estuarine Subtidal	N/A	Coastal Salt Pond
	Estuarine Intertidal	N/A	Salt Marsh Brackish Tidal Marsh Freshwater Tidal Marsh Fresh/Brackish Tidal Shrubland Fresh/Brackish Tidal Swamp

REFERENCES

Barbour, H., T. Simmons, P. Swain, and H. Woolsey. 1998. Our irreplaceable heritage. Protecting biodiversity in Massachusetts. Natural Heritage and Endangered Species Program, Massachusetts Division of Fisheries and Wildlife, and the Massachusetts Chapter of The Nature Conservancy. Westborough, MA.

Cavanagh, P. M., and M. Simoneaux. 2003. Planning for wildlife: Improving wildlife conservation through better open space and recreation plans. Regional Conservation Planning Program, Manomet Center for Conservation Sciences. Manomet, MA.

Cowardin, L. M., V. Carter, F. C. Golet, and E. T. LaRoe. 1979. Classification of wetlands and deepwater habitats of the United States. FWS/OBS-79/31. December 1979. U.S. Department of the Interior, Fish and Wildlife Service, Office of Biological Services. Washington, DC.

Division of Conservation Services. 2001. Open space and recreation plan requirements. DCS Form Rev. 6/01. Massachusetts Executive Office of Environmental Affairs, Division of Conservation Services. Boston, MA.

Jackson, S. 1995. Delineating bordering vegetated wetlands under the Massachusetts Wetlands Protection Act. A handbook. March 1995. Department of Environmental Protection, Division of Wetlands and Waterways. Boston, MA. Available at: www.state.ma.us/dep/brp/ww/files/bvwmanual.pdf.

Lewis, W. H. 1977. Ecology field glossary: a naturalist's vocabulary. Greenwood Press. Westport, CT.

Sorrie, B. A., and P. Somers. 1999. The vascular plants of Massachusetts: a county checklist. Massachusetts Division of Fisheries and Wildlife, Natural Heritage and Endangered Species Program. Westborough, MA.

Sperduto, D. D., and K. F. Crowley. 2001. Overview of the natural communities of New Hampshire. New Hampshire Natural Heritage Inventory, DRED – Division of Forests and Lands. Concord, NH.

Sperduto, D. D., and W. F. Nichols. 2004. Natural communities of New Hampshire. The New Hampshire Natural Heritage Bureau and The Nature Conservancy. Concord, NH.

Swain, P., and J. B. Kearsley. 2001. Classification of the natural communities of Massachusetts. Draft, September 2001. Massachusetts Natural Heritage and Endangered Species Program. Westborough, MA.

United States Department of Agriculture, Natural Resources Conservation Service. 2004. The PLANTS database, version 3.5. National Plants Data Center. Baton Rouge, LA. Available at: http://plants.usda.gov.

United States Geologic Survey. n.d. Water basics. Glossary. Available at http://capp.water.usgs.gov/GIP/h20_gloss/.

GLOSSARY

Absent. A category of vegetative closure (e.g., canopy closure.) Absent is equal to 0%.

Acidic. In common usage this term refers to substances having a pH of less than 7. Cowardin et al. (1979) apply this term only to substances with a pH of less than 5.5.

Alluvial. Alluvial communities are located adjacent to rivers or streams, and the term typically refers to natural communities within flood plains.

Aspect. The direction that a slope faces.

Bog. "A nutrient-poor, acidic wetland dominated by a waterlogged, spongy mat of sphagnum moss that ultimately forms a thick layer of acidic peat; generally has no inflow or outflow; fed primarily by rain water." (USGS n.d.)

Brackish. "Water with a salinity intermediate between seawater and freshwater…" (USGS n.d.)

Calcareous. "A rock or substance formed of calcium carbonate or magnesium carbonate by biological deposition of inorganic precipitation, or containing those minerals in sufficient quantities to effervesce when treated with cold hydrochloric acid." (USGS n.d.) Carbonate rocks include limestone, dolomite, and gypsum.

Canopy. "An overlapping leaf layer formed by crowns of the tallest trees in a forest" (Lewis 1977.)

Central Hardwoods. Within the natural community classification system this term refers to deciduous trees typical of central or southern climates, especially oaks.

Circumneutral. "Term applied to water with a pH of 5.5 to 7.4" (Cowardin et al. 1979.)

Cliff. A vertical rock face.

Clumped. Natural community descriptions refer to the distribution of vegetation, by strata (canopy, sub-canopy, etc.) as either Clumped or Even. Clumped vegetation is aggregated into patches or clusters of vegetation.

Cobble. Substrate of rocks, usually rounded by scouring, deposited along rivers by high velocity currents.

Conifer dominated. Palustrine Forested communities are considered conifer dominated if >75% of canopy is composed of coniferous trees.

Coniferous. Terrestrial Forest/Woodland communities are considered coniferous if there is >75% coniferous trees in the canopy.

Deciduous. Terrestrial Forest/Woodland communities are considered deciduous if there is >75% deciduous trees in the canopy. Deciduous species are "…plants that shed foliage at the end of the growing season" (USGS n.d.)

Decision Rules. A set of rules, developed by MassWildlife, to classify vegetative cover on Wildlife Management Areas. Decision rules do not correspond exactly with Swain and Kearsley's (2001) Natural Community Classification.

Dense. A category of vegetative closure (e.g., canopy closure.) Dense is equal to 75% or more closure.

Dominant Vegetation. The most abundant species of plant in each strata of a natural community. For example, white pine dominates the canopy in the Successional White Pine Community, while black ash and red maple are co-dominant in the Red Maple - Black Ash Swamp Community.

Ecoregion. "An area of similar climate, landform, soil, potential natural vegetation, hydrology, or other ecologically relevant variables" (USGS n.d.)

Emergent Plants. "Erect, rooted, herbaceous plants that may be temporarily or permanently flooded at the base but do not tolerate prolonged inundation of the entire plant" (USGS n.d.)

Ericaceous. Refers to plants in the family Ericaceae. Includes such plants as blueberries, laurels, bearberry, leatherleaf, heaths, and trailing arbutus.

Estuarine. "Estuarine communities are subject to varying salinity, tidal actions, and wind. Estuaries include tidal habitats and adjacent tidal wetlands in which ocean water is at least occasionally diluted by freshwater from the land. Estuarine areas extend landward and up streams to where oceanic salts (formally defined as above 0.5 ppt salinity in an annual average low flow period) or tides (including freshwater tidal areas) have an influence on the vegetation" (Swain and Kearsley 2001.)

Even. Natural Community descriptions refer to the distribution of vegetation, by strata (canopy, sub-canopy, etc.) as either Clumped or Even. Even vegetation is regularly distributed, or is ubiquitous.

Fen. "Peat-accumulating wetland that generally receives water from surface runoff and (or) seepage from mineral soils in addition to direct precipitation; generally alkaline; or slightly acid." (USGS n.d.)

Flat. "A level landform composed of unconsolidated sediments – usually mud or sand. Flats may be irregularly shaped or elongate and continuous with the shore…" (Cowardin et al. 1979.)

Forest/Woodland. A Terrestrial community is considered to be a Forest/Woodland (i.e., forested) if there is >25% tree canopy.

Forested. A Palustrine community is generally considered forested if there is >50% tree canopy.

Graminoid. A term referring to true grasses (Family Poaceae) and grass-like plants, such as sedges and rushes.

Grassland. A graminoid dominated community within the Terrestrial System and Herbaceous Sub-system. Grasslands have <25% tree and shrub cover. Two grassland communities are recognized under the Massachusetts classification system: Sandplain Grassland, and Cultural Grassland.

Hardwood Dominated. Palustrine Forested communities are considered hardwood dominated if >75% of canopy is composed of deciduous trees.

Heathland. A Terrestrial shrub community dominated by scrub oak. Other characteristic plants include bayberry, golden heather, chokeberry, dwarf chinquapin oak, and sweetfern.

Herbaceous. "With the characteristics of an herb, a plant with no persistent woody stem above ground." (Cowardin et al. 1979)

Hummock-hollow. A term describing the microtopography of wetland communities (e.g., Red Maple - Black Ash Swamp) with a basin structure where the vegetation is arranged in elevated clumps (hummocks) surrounded by depressions (hollows.)

Interdunal. Located between dunes, such as the Interdunal Marsh/Swale community.

Intermediate. A category of vegetative closure (e.g., canopy closure.) Intermediate is equal to 25-75% closure.

Marine. "Marine habitats are exposed to the waves and currents of the open ocean and the water regimes are determined primarily by the ebb and flow of oceanic tides." "Shallow coastal indentations or bays without appreciable freshwater inflow, and coasts with exposed rocky islands that provide the mainland with little or no shelter from the wind and waves are also considered…" marine (Cowardin et al. 1979.)

Under Massachusetts' natural community classification system the marine environment extends from the Marine Subtidal

Flat community to either the Beach Strand Community or an estuarine community.

Maritime. Maritime communities are exposed to salt spray, which influences the vegetation. Exposure may be within the daily range of salt spray (e.g., Maritime Juniper Woodland/Shrubland) or out of the daily range of salt spray (e.g., Maritime Pitch Pine on Dunes.)

Marsh. "A water-saturated, poorly drained area, intermittently or permanently water covered, having aquatic and grasslike vegetation." (USGS n.d.)

Mesic. Moist conditions, often associated with nutrient-rich conditions.

Mixed Coniferous-Deciduous. Terrestrial Forest/Woodland communities are considered mixed if there is 25-75% of deciduous trees in the canopy and 25-75% coniferous trees in the canopy.

Natural community. A distinct grouping of plant species that occur together in recurring patterns. Communities have definite plant species composition, consistent physical structure, and specific physical conditions (Sperduto and Crowley 2004.)

Non-forested. A Palustrine community is considered non-forested if there is <50% tree canopy.

Northern Hardwoods. Within the natural community classification system this term refers to deciduous trees typical of northern climates, especially maples. Aspen, and white and yellow birch are also considered northern hardwoods.

Open. A Sub-system within the Terrestrial System. The Open Sub-system is characterized by sparse vegetation, with <25% herbaceous, shrub, or tree cover.

Outcrop. Areas of mostly horizontal, exposed bedrock.

Outwash Plain. An "alluvial plain formed around the margin of an ice sheet or beyond a glacier fed by subglacial streams carrying glacial drift from the glacier" (Lewis 1977.)

Palustrine. The Palustrine System includes "all freshwater, non-tidal wetlands dominated by trees, shrubs, or persistent emergents, including mosses and lichens" (Swain and Kearsley 2001.)

The Palustrine System does not include the following: (1) areas with submersed and floating leaved aquatic plants; (2) tidal wetlands, including freshwater tidal wetlands; and (3) riverside communities.

pH. "A measure of the acidity (less than 7) or alkalinity (greater than 7) of a solution; a pH of 7 is considered neutral" (USGS n.d.) Alternatively, acid may refer to a pH of 5.5 or less, alkaline to a pH of greater than 7.4, and circumneutral for a pH greater than 5.5 through 7.4 (Cowardin et al. 1979.)

ppt. Abbreviation for parts per thousand.

Saline. "General term for waters containing various dissolved salts" (Cowardin et al. 1979.)

Sandplain. A term used synonymously with outwash plain.

Seep. "A small area where water percolates … slowly to the land surface" (USGS n.d.)

Shrub. "A woody plant which at maturity is usually less than 6 m (20 feet) tall and generally exhibits several erect, spreading, or prostrate stems and has a bushy appearance; e.g., speckled alder (*Alnus rugosa*) or buttonbush (*Cephalanthus occidentalis*)" (Cowardin et al. 1979.)

In the context of this classification system, shrub refers to the vegetation layer between the sub-canopy and the herbaceous layer. In eastern Massachusetts this tends to be from approximately 0.5 – 3.0 m (approximately 1.5 – 10 feet.)

Slope. Literally a measure of deviation from the horizontal (e.g., a 10% slope.) This term is often used to refer to a hillside.

Sparse. A category of vegetative closure (e.g., canopy closure.) Sparse is equal to 25% or less closure.

Sphagnum. Plants belonging to the genus *Sphagnum* are typically referred to as peat mosses. Within the Palustrine System natural communities with a Sphagnum ground cover are classified as either peatlands (e.g., Acidic Shrub Fen) or bogs (e.g., Atlantic White Cedar Bog.)

State Rank (SRANK.) A value (from 1 to 5) assigned to a natural community or organism that reflects its rarity in the state. A section on State Rank has been included in the *Using This Guide* section of this guide (Page 4.)

Structural Dominance. A dominant physical characteristic or feature used to classify natural communities. For example, the amount of open space, herbaceous cover, shrub, and tree canopy are structural features used to classify Sub-systems within the Terrestrial System.

Swamp. "An area intermittently or permanently covered with water, and having trees and shrubs" (USGS n.d.) Swamp communities are in the Palustrine System, and either the Non-Forested (e.g., Shrub Swamps) or Forested Sub-systems.

Talus. "A mass of boulders and smaller rocky fragments derived from the weathering of cliffs or slopes and accumulating at their bases in a sloping pile [skree]" (Lewis 1977.)

Terrestrial. "The vegetation of Terrestrial communities is not significantly influenced by standing or moving water" (Swain and Kearsley 2001.) These are the "upland" communities.

Topography. "The position in a landscape, including elevation and change in slope" (Jackson 1995.)

Xeric. Dry conditions, often in association with nutrient-poor conditions.

LIST OF COMMON NAMES, SCIENTIFIC NAMES, AND SPECIES CODES FOR PLANTS LISTED IN THIS GUIDE

Common Name [1]	Scientific Name [2]	Species Code [3]
Alder	*Alnus* spp.	ALNUS
Alder, Smooth	*Alnus serrulata*	ALSE2
Alder, Speckled	*Alnus incana* ssp. *rugosa*	ALINR
Algae		-
Arrow-arum	*Peltandra virginica*	PEVI
Arrowhead	*Sagittaria* spp.	SAGIT
Arrowhead, Common	*Sagittaria latifolia* var. *latifolia*	SALA2
Arrowhead, Grass-leaf	*Sagittaria graminea*	SAGR
Arrowhead, River	*Sagittaria subulata*	SASU
Arrowhead, Sessile-fruited	*Sagittaria rigida*	SARI
Arrow-weed	*Sagittaria* spp.	SAGIT
Arrow-wood, Downy	*Viburnum rafinesquianum*	VIRA
Arrow-wood, Northern	*Viburnum dentatum* var. *lucidum*	VIDEL
Ash, Black	*Fraxinus nigra*	FRNI
Ash, Green	*Fraxinus pennsylvanica*	FRPE
Ash, White	*Fraxinus americana*	FRAM2
Aspen, Big-toothed	*Populus grandidentata*	POGR4
Aspen, Quaking	*Populus tremuloides*	POTR5
Aster, New York	*Aster novi-belgii*	ASNO2
Aster, Stiff	*Ionactis linariifolius*	IOLI2
Autumn Fimbry	*Fimbristylis autumnalis*	FIAU2
Autumn-willow	*Salix serissima*	SASE2
Avens, Floodplain	*Geum laciniatum*	GELA
Avens, Purple	*Geum rivale*	GERI2
Avens, White	*Geum canadense*	GECA7
Azalea, Swamp	*Rhododendron viscosum*	RHVI2
Baneberry, White	*Actaea pachypoda*	ACPA
Barberry, Japanese	*Berberis thungbergii*	BETH
Basswood	*Tilia* spp.	TILIA
Bayberry	*Myrica pensylvanica*	MYPE7
Beach-plum	*Prunus maritima*	PRMA2
Beachgrass, American	*Ammophila breviligulata*	AMBR
Beak-sedge, Brown	*Rhynchospora capitellata*	RHCA12
Beak-sedge, White	*Rhynchospora alba*	RHAL3
Bearberry	*Arctostaphylos uva-ursi*	ARUV
Bedstraw	*Galium* spp.	GALIU
Bedstraw, Fen-	*Galium labradoricum*	GALA2
Bedstraw, Labrador	*Galium labradoricum*	GALA2
Beech	*Fagus* spp.	FAGUS
Beech, American	*Fagus grandifolia*	FAGR
Beggar-tick	*Bidens* spp.	BIDEN
Beggar-tick, Estuary	*Bidens hyperborea* var. *colpophila*	BIHYC2
Bellwort	*Uvularia sessilifolia*	UVSE
Bellwort, Perfoliate	*Uvularia perfoliata*	UVPE
Bentgrass, Creeping	*Agrostis stolonifera*	AGST2
Bentgrass, Marsh	*Agrostis stolonifera*	AGST2

LIST OF COMMON NAMES, SCIENTIFIC NAMES, AND SPECIES CODES FOR PLANTS LISTED IN THIS GUIDE (CONTINUED)

Common Name [1]	Scientific Name [2]	Species Code [3]
Bindweed, Fringed	*Polygonum cilinode*	POCI
Birch, Black	*Betula lenta*	BELE
Birch, Downy	*Betula pubescens*	BEPU5
Birch, Gray	*Betula populifolia*	BEPO
Birch, Heart-leaf Paper	*Betula cordifolia*	BEPAC2
Birch, Paper	*Betula papyrifera*	BEPA
Birch, River	*Betula nigra*	BENI
Birch, Swamp	*Betula pumila*	BEPU4
Birch, Yellow	*Betula alleghaniensis*	BEAL2
Bishop's Cap	*Mitella diphylla*	MIDI3
Bittercress, Dry Land	*Cardamine parviflora*	CAPA12
Bittersweet, Oriental	*Celastrus orbiculata*	CEOR
Blackberry	*Rubus* spp.	RUBUS
Bladdernut	*Staphylea trifolia*	STTR
Bladder-sedge	*Carex intumescens*	CAIN
Bloodroot	*Sanguinaria canadensis*	SACA13
Blue Curls	*Trichostema dichotomum*	TRDI2
Blueberry	*Vaccinium* spp.	VACCI
Blueberry, Early Sweet	*Vaccinium pallidum*	VAPA4
Blueberry, Highbush	*Vaccinium corymbosum*	VACO
Blueberry, Low Bush	*Vaccinium angustifolium*	VAAN
Blueberry, Low Bush	*Vaccinium pallidum*	VAPA4
Bluejoint	*Calamagrostis canadensis*	CACA4
Bluejoint, Canada	*Calamagrostis canadensis*	CACA4
Bluestem, Big	*Andropogon gerardii*	ANGE
Bluestem, Little	*Schizachyrium scoparium*	SCSC
Bluet, Long-leaved	*Houstonia longifolia*	HOLO
Bog-sedge, Silvery	*Carex canescens* ssp. *arctiformis*	CAAR14
Bog-sedge, Three-seeded	*Carex trisperma*	CATR10
Bottlebrush-grass	*Hystrix patula*	HYPA3
Boxelder	*Acer negundo*	ACNE2
Bracken (fern)	*Pteridium aquilinum*	PTAQ
Broad-leaved Spring Beauty	*Claytonia caroliniana*	CLCA
Buckthorn	*Rhamnus* spp.	RHAMN
Buckthorn, Alder-leaf	*Rhamnus alnifolia*	RHAL
Buckthorn, Common	*Rhamnus cathartica*	RHCA3
Buckthorn, European	*Rhamnus frangula*	RHFR
Buckthorn, European Alder	*Rhamnus frangula*	RHFR
Buckthorn, Smooth	*Rhamnus frangula*	RHFR
Bugleweed	*Lycopus* spp.	LYCOP4
Bulrush	*Scirpus* spp.	SCIRP
Bulrush, Saltmarsh	*Scirpus robustus*	SCRO
Bulrush, Threesquare	*Scirpus pungens*	SCPU3
Bunchberry	*Cornus canadensis*	COCA13
Bur-marigold, Nodding	*Bidens cernua*	BICE

LIST OF COMMON NAMES, SCIENTIFIC NAMES, AND SPECIES CODES FOR PLANTS LISTED IN THIS GUIDE (CONTINUED)

Common Name [1]	Scientific Name [2]	Species Code [3]
Burnet, Canadian	*Sanguisorba canadensis*	SACA14
Bur-reed	*Sparganium* spp.	SPARG
Bush-clover	*Lespedeza* spp.	LESPE
Bush-clover, Trailing	*Lespedeza procumbens*	LEPR
Bush Honeysuckle	*Diervilla lonicera*	DILO
Butternut	*Juglans cinerea*	JUCI
Butterfly Weed	*Asclepias tuberosa*	ASTU
Buttonbush	*Cephalanthus occidentalis*	CEOC2
Canadian Burnet	*Sanguisorba canadensis*	SACA14
Catbrier	*Smilax rotundifolia*	SMRO
Cat-tail, Broad-leaved	*Typha latifolia*	TYLA
Cat-tail, Common	*Typha latifolia*	TYLA
Cat-tail, Narrow-leaved	*Typha angustifolia*	TYAN
Cedar, Atlantic White	*Chamaecyparis thyoides*	CHTH2
Cedar, Eastern Red	*Juniperus virginiana*	JUVI
Celery, Wild	*Vallisneria americana*	VAAM3
Chain-fern, Virginia	*Woodwardia virginica*	WOVI
Cherry, Black	*Prunus serotina*	PRSE2
Cherry, Fire	*Prunus pensylvanica*	PRPE2
Cherry, Pin	*Prunus pensylvanica*	PRPE2
Chestnut, American	*Castanea dentata*	CADE12
Chokeberry	*Aronia arbutifolia*	ARAR7
Chokeberry, Black	*Aronia melanocarpa*	ARME6
Chokecherry, Black	*Aronia melanocarpa*	ARME6
Cinquefoil, Shrubby	*Pentaphylloides floribunda*	PEFL15
Clearweed	*Pilea pumila*	PIPU2
Clematis	*Clematis* spp.	CLEMA
Clematis, Purple	*Clematis occidentalis*	CLOC2
Cliff-brake, Purple	*Pellaea atropurpurea*	PEAT2
Clubmoss	*Lycopodium* spp.	LYCOP2
Clubmoss, Bristly	*Lycopodium annotinum*	LYAN
Clubmoss, Southern Bog	*Lycopodium adpressum*	LYAD3
Cohosh, Blue	*Caulophyllum thalictroides*	CATH2
Columbine	*Aquilegia canadensis*	AQCA
Coontail	*Ceratophyllum demersum*	CEDE4
Cord-grass, Freshwater	*Spartina pectinata*	SPPE
Cord-grass, Saltmarsh	*Spartina alterniflora*	SPAL
Cord-grass, Saltwater	*Spartina alterniflora*	SPAL
Coreopsis, Rose	*Coreopsis rosea*	CORO
Corydalis, Pale	*Corydalis sempervirens*	COSE5
Corydalis, Tall	*Corydalis sempervirens*	COSE5
Cottonwood	*Populus deltoides*	PODE3
Cow-wheat	*Melampyrum lineare*	MELI2
Cranberry	*Vaccinium* spp.	VACCI
Cranberry, Large	*Vaccinium macrocarpon*	VAMA
Cranberry, Small	*Vaccinium oxycoccos*	VAOX
Creeper, Virginia	*Parthenocissus quinquefolia*	PAQU2
Crowfoot, Seaside	*Ranunculus cymbalaria*	RACY

LIST OF COMMON NAMES, SCIENTIFIC NAMES, AND SPECIES CODES FOR PLANTS LISTED IN THIS GUIDE (CONTINUED)

Common Name [1]	Scientific Name [2]	Species Code [3]
Currant	*Ribes* spp.	RIBES
Currant, Wild Black	*Ribes americanum*	RIAM2
Cut-grass, Rice	*Leersia oryzoides*	LEOR
Dandelion, Dwarf	*Krigia virginica*	KRVI
Dangleberry	*Gaylussacia frondosa*	GAFR2
Dewberry	*Rubus* spp.	RUBUS
Dewberry, Swamp	*Rubus hispidus*	RUHI
Ditch-stonecrop	*Penthorum sedoides*	PESE6
Dogbane, Prostrate	*Apocynum cannabinum var. hypericifolium*	APCAH
Dogwood, Alternate-leaved	*Cornus alternifolia*	COAL2
Dogwood, Flowering	*Cornus florida*	COFL2
Dogwood, Gray	*Cornus racemosa*	CORA6
Dogwood, Round-leaved	*Cornus rugosa*	CORU
Dogwood, Silky	*Cornus amomum*	COAM2
Duckweed	*Lemna* spp.	LEMNA
Dutchman's Breeches	*Dicentra cucullaria*	DICU
Eelgrass	*Zostera marina*	ZOMA
Elderberry, Common	*Sambucus canadensis*	SACA12
Elderberry, Red-berried	*Sambucus racemosa* ssp. *pubens*	SARAP
Elm	*Ulmus* spp.	ULMUS
Elm, American	*Ulmus americana*	ULAM
Elm, Slippery	*Ulums rubra*	ULRU
False Hellebore	*Veratrum viride*	VEVI
False Nettle	*Boehmeria cylindrica*	BOCY
Fern, Bracken	*Pteridium aquilinum*	PTAQ
Fern, Bulblet	*Cystopteris bulbifera*	CYBU3
Fern, Christmas	*Polystichum acrostichoides*	POAC4
Fern, Cinnamon	*Osmunda cinnamomea*	OSCI
Fern, Fragile	*Cystopteris fragilis*	CYFR2
Fern, Goldie's (Wood)	*Dryopteris goldiana*	DRGO
Fern, Hay Scented	*Dennstaedtia punctilobula*	DEPU2
Fern, Lady	*Athyrium filix-femina*	ATFI
Fern, Maidenhair	*Adiantum pedatum*	ADPE
Fern, Marginal Wood	*Dryopteris marginalis*	DRMA4
Fern, Marsh	*Thelypteris palustris var. pubescens*	THPAP
Fern, Massachusetts	*Thelypteris simulata*	THSI2
Fern, Ostrich	*Matteuccia struthiopteris*	MAST
Fern, Royal	*Osmunda regalis var. spectabilis*	OSRES
Fern, Rusty Cliff	*Woodsia ilvensis*	WOIL
Fern, Sensitive	*Onoclea sensibilis*	ONSE
Fern, Walking	*Asplenium rhizophyllum*	ASRH2
Fetterbush	*Leucothoe racemosa*	LERA4
Fir, Balsam	*Abies balsamea*	ABBA
Flag, Northern Blue	*Iris versicolor*	IRVE2
Flag, Sweet	*Acorus calamus*	ACCA4

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Flatsedge, Awned	*Cyperus squarrosus*	CYSQ
Flatsedge, Seaside	*Cyperus filicinus*	CYFI
Foxglove, Downy False	*Aureolaria virginica*	AUVI
Foxglove, Fern-leaf False	*Aureolaria pedicularia*	AUPE
Foxglove, Smooth False	*Aureolaria flava*	AUFL
Fumitory, Climbing	*Adlumia fungosa*	ADFU
Gale, Sweet	*Myrica gale*	MYGA
Geranium, Wild	*Geranium maculatum*	GEMA
Gerardia, Slender	*Agalinis tenuifolia*	AGTE3
Glasswort	*Salicornia* spp.	SALIC
Goat's Rue	*Galega officinalis*	GAOF
Golden Pert	*Gratiola aurea*	GRAU
Goldenrod	*Solidago* spp.	SOLID
Goldenrod	*Euthamia* spp.	EUTHA
Goldenrod, Coastal Flat-topped	*Euthamia tenuifolia*	EUTE7
Goldenrod, Rough-leaved	*Solidago patula*	SOPA2
Goldenrod, Seaside	*Solidago sempervirens*	SOSE
Goldenrod, Slender-leaved	*Euthamia tenuifolia*	EUTE7
Goldenrod, Stout	*Solidago squarrosa*	SOSQ
Goldenrod, White	*Solidago bicolor*	SOBI
Goldenrod, Zigzag	*Solidago flexicaulis*	SOFL2
Goldthread	*Coptis trifolia*	COTR2
Grape	*Vitis* spp.	VITIS
Grape, Summer	*Vitis aestivalis*	VIAE
Grape, River-bank	*Vitis riparia*	VIRI
Grass (use Graminoid code)		2GRAM
Grass, American Beach	*Ammophila breviligulata*	AMBR
Grass, Black	*Juncus gerardii*	JUGE
Grass, Bottlebrush-	*Hystrix patula*	HYPA3
Grass, Canada Blue	*Poa compressa*	POCO
Grass, Cock-spur	*Echinochloa muricata*	ECMU2
Grass, Common Hair	*Deschampsia flexuosa*	DEFL
Grass, Dune	*Ammophila breviligulata*	AMBR
Grass, Little Blue Stem	*Schizachyrium scoparium*	SCSC
Grass, Poverty	*Danthonia spicata*	DASP2
Grass, Reed Canary	*Phalaris arundinacea*	PHAR3
Grass, Spike	*Distichlis spicata*	DISP
Grass, Stalked Wool	*Scirpus pedicellatus*	SCPE3
Grass, White	*Leersia virginica*	LEVI2
Grass, Wool	*Scirpus cyperinus*	SCCY
Grass, Yellow-eyed	*Xyris* spp.	XYRIS
Grass-of-Parnassus	*Parnassia glauca*	PAGL3
Groundsel, Balsam	*Senecio pauperculus*	SEPA5
Groundsel-tree	*Baccharis halimifolia*	BAHA
Gum, Black (Tupelo)	*Nyssa sylvatica*	NYSY

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Hackberry	*Celtis occidentalis* var. *pumila*	CEOCP
Hairgrass, Common	*Deschampsia flexuosa*	DEFL
Harebell	*Campanula rotundifolia*	CARO2
Hay, Salt	*Spartina patens*	SPPA
Hay, Salt Marsh	*Spartina patens*	SPPA
Hazelnut	*Corylus sp.*	CORYL
Hazelnut, American	*Corylus americana*	COAM3
Hazelnut, Beaked	*Corylus cornuta*	COCO6
Heather, Beach	*Hudsonia tomentosa*	HUTO
Heather, Golden	*Hudsonia ericoides*	HUER
Hellebore, False	*Veratrum viride*	VEVI
Hemlock	*Tsuga canadensis*	TSCA
Hemlock, Eastern	*Tsuga canadensis*	TSCA
Hempweed, Climbing	*Mikania scandens*	MISC
Hepatica	*Hepatica nobilis*	HENO2
Hepatica	*Hepatica nobilis* var. *obtusa*	HENOO
Herb Robert	*Geranium robertianum*	GERO
Hickory	*Carya* spp.	CARYA
Hickory, Bitternut	*Carya cordiformis*	CACO15
Hickory, Mockernut	*Carya alba*	CAAL27
Hickory, Pignut	*Carya glabra*	CAGL8
Hickory, Shagbark	*Carya ovata*	CAOV2
Hickory, Sweet Pignut	*Carya glabra*	CAGL8
Hickory, Sweet Pignut	*Carya ovalis*	CAOV3
Hobblebush	*Viburnum lantanoides*	VILA11
Holly, American	*Ilex opaca*	ILOP
Holly, Mountain-	*Nemopanthus mucronatus*	NEMU2
Holly, Winterberry	*Ilex verticillata*	ILVE
Honewort	*Cryptotaenia canadensis*	CRCA9
Honeysuckle	*Lonicera* spp.	LONIC
Honeysuckle, Fly	*Lonicera canadensis*	LOCA7
Honeysuckle, Hairy	*Lonicera hirsuta*	LOHI
Hop-hornbeam	*Ostrya virginiana*	OSVI
Horsetail	*Equisetum* spp.	EQUIS
Horsetail, Common	*Equisetum arvense*	EQAR
Horsetail, River	*Equisetum fluviatile*	EQFL
Huckleberry	*Gaylussacia baccata*	GABA
Huckleberry, Black	*Gaylussacia baccata*	GABA
Huckleberry, Dwarf	*Gaylussacia dumosa*	GADU
Indian Cucumber-root	*Medeola virginiana*	MEVI
Indigo, Yellow Wild	*Baptisia tinctoria*	BATI
Inkberry	*Ilex glabra*	ILGL
Ironwood	*Carpinus caroliniana*	CACA18
Ivy, Poison	*Toxicodendron radicans*	TORA2

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Jack-in-the-pulpit	*Arisaema triphyllum*	ARTR
Jewelweed	*Impatiens capensis*	IMCA
Jewelweed, Yellow	*Impatiens pallida*	IMPA
Joe-Pye-weed, Spotted	*Eupatorium maculatum*	EUMA6
Jointweed, Sand	*Polygonella articulata*	POAR4
Jumpseed	*Polygonum (Tovara) virginianum*	POVI2
Knotweed, Japanese	*Polygonum cuspidatum*	POCU6
Labrador Tea	*Ledum groenlandicum*	LEGR
Lady's Slipper, Pink	*Cypripedium acaule*	CYAC3
Lakeshore Hemicarpha	*Hemicarpha micrantha*	HEMI5
Laurel, Bog	*Kalmia polifolia*	KAPO
Laurel, Mountain	*Kalmia latifolia*	KALA
Laurel, Sheep	*Kalmia angustifolia*	KAAN
Leatherleaf	*Chamaedaphne calyculata* var. *angustifolia*	CHCAA2
Leatherwood	*Dirca palustris*	DIPA9
Lichen (general)	many species	2LICHN
Lichen, crustose (general)	many species	2LC
Lichen, fruticose (general)	many species	2LU
Lily, Bluebead	*Clintonia borealis*	CLBO3
Lily, Mud	*Lilaeopsis chinensis*	LICH
Lily, Trout	*Erythronium americanum*	ERAM5
Loosestrife, Purple	*Lythrum salicaria*	LYSA2
Loosestrife, Swamp	*Lysimachia thyrsiflora*	LYTH2
Loosestrife, Whorled	*Lysimachia quadrifolia*	LYQU2
Lupine	*Lupinus perennis*	LUPE3
Maleberry	*Lyonia ligustrina*	LYLI
Mannagrass	*Glyceria acutifolia*	GLAC
Mannagrass	*Glyceria pallida*	GLPA5
Maple, Mountain	*Acer spicatum*	ACSP2
Maple, Red	*Acer rubrum*	ACRU
Maple, Silver	*Acer saccharinum*	ACSA2
Maple, Striped	*Acer pensylvanicum*	ACPE
Maple, Sugar	*Acer saccharum*	ACSA3
Marigold, Marsh	*Caltha palustris*	CAPA5
Marsh-elder, Salt	*Iva frutescens*	IVFR
Marsh-sedge	*Carex lacustris*	CALA16
Mayflower	*Epigaea repens*	EPRE2
Mayflower, Canada	*Maianthemum canadense*	MACA4
Meadow Beauty	*Rhexia virginica*	RHVI
Meadow-rue	*Thalictrum* spp.	THALI2
Meadow-rue, Early	*Thalictrum dioicum*	THDI
Meadow-rue, Skunk	*Thalictrum revolutum*	THRE
Meadowsweet	*Spirea alba* var. *latifolia*	SPALL
Mermaid-weed	*Proserpinaca palustris*	PRPA3
Milkweed, Four-leaved	*Asclepias quadrifolia*	ASQU
Milkweed, Swamp	*Asclepias incarnata*	ASIN

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Mitrewort	*Mitella* spp.	MITEL
Mitrewort, Naked	*Mitella nuda*	MINU3
Mock Bishop's-weed	*Ptilimnium capillaceum*	PTCA
Monkey Flowers, Long-stalked	*Mimulus ringens*	MIRI
Monkey Flowers, Winged	*Mimulus alatus*	MIAL2
Moss (general)		2MOSS
Moss, Sphagnum	*Sphagnum* spp.	SPHAG2
Mountain-ash, American	*Sorbus americana*	SOAM3
Mountain-holly, Common	*Nemopanthus mucronatus*	NEMU2
Mudwort	*Limosella australis*	LIAU6
Mudwort, Atlantic	*Limosella australis*	LIAU6
Naiad	*Najas* spp.	NAJAS
Nannyberry	*Viburnum lentago*	VILE
Nettle, False	*Boehmeria cylindrica*	BOCY
New Jersey Tea	*Ceanothus americanus*	CEAM
Nightshade, Enchanter's	*Circaea lutetiana* ssp. *canadensis*	CILUC
Nightshade, Small Enchanter's	*Circaea alpina*	CIAL
Nut-rush	*Scleria triglomerata*	SCTR
Oak	*Quercus* spp.	QUERC
Oak, Black	*Quercus velutina*	QUVE
Oak, Bur	*Quercus macrocarpa*	QUMA2
Oak, Chestnut	*Quercus prinus*	QUPR2
Oak, Dwarf Chestnut	*Quercus prinoides*	QUPR
Oak, Dwarf Chinquapin	*Quercus prinoides*	QUPR
Oak, Northern Red	*Quercus rubra*	QURU
Oak, Pin	*Quercus palustris*	QUPA2
Oak, Post	*Quercus stellata*	QUST
Oak, Rock Chestnut	*Quercus prinus*	QUPR2
Oak, Scarlet	*Quercus coccinea*	QUCO2
Oak, Scrub	*Quercus ilicifolia*	QUIL
Oak, Swamp White	*Quercus bicolor*	QUBI
Oak, White	*Quercus alba*	QUAL
Oak, Yellow	*Quercus muehlenbergii*	QUMU
Oats, Wild	*Uvularia sessilifolia*	UVSE
Orache, Seabeach	*Atriplex pentandra*	ATPE
Orchids	Orchidaceae family	-
Panic-grass, Fall	*Panicum dichotomiflorum*	PADI
Partridge-berry	*Mitchella repens*	MIRE
Pea, Beach	*Lathyrus japonicus*	LAJA
Peanut, Hog	*Amphicarpaea bracteata*	AMBR2
Pearlwort, Knotted	*Sagina nodosa* ssp. *nodosa*	SANON
Pepper-bush, Sweet	*Clethra alnifolia*	CLAL3
Phragmites (Common Reed)	*Phragmites australis*	PHAU7
Pickerel-weed	*Pontederia cordata* var.*cordata*	POCO14
Pimpernel, False	*Lindernia dubia*	LIDU
Pimpernel, Inundated False	*Lindernia dubia* var. *inundata*	LIDUI
Pimpernel, Water	*Samolus valerandi* var. *parviflorus*	SAVAP

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Pine, Pitch	*Pinus rigida*	PIRI
Pine, Red	*Pinus resinosa*	PIRE
Pine, White	*Pinus strobus*	PIST
Pinweed	*Lechea intermedia*	LEIN
Pipewort	*Eriocaulon aquaticum*	ERAQ2
Pipewort, Estuary	*Eriocaulon parkeri*	ERPA4
Pitcher Plant	*Sarracenia* spp.	SARRA
Plantain, Seaside	*Plantago maritima*	PLMA3
Plum, Beach-	*Prunus maritima*	PRMA2
Pogonia, Rose	*Pogonia ophioglossoides*	POOP
Poison Ivy	*Toxicodendron radicans*	TORA2
Polygala, Fringed	*Polygala paucifolia*	POPA5
Polypody, Common (Rock)	*Polypodium virginianum*	POVI7
Pondweed, Horned	*Zannichellia palustris*	ZAPA
Pondweed, Sago	*Potamogeton pectinatus*	POPE6
Pond-lily, Yellow	*Nuphar variegata*	NUVA2
Prickly Ash	*Zanthoxylum americanum*	ZAAM
Pussytoes, Plaintain-leaved	*Antennaria plantaginifolia*	ANPL
Pygmy-weed, Shore	*Crassula aquatica*	CRAQ
Pyrola, One-sided	*Orthilia secunda*	ORSE
Quillwort, Riverbank	*Isoetes riparia*	ISRI
Ragwort, Broad-leaved	*Senecio obovatus*	SEOB2
Ragwort, Golden	*Senecio aureus*	SEAU2
Raspberry, Purple-flowering	*Rubus odoratus*	RUOD
Rattlesnakeweed	*Hieracium venosum*	HIVE
Reed, Bur	*Sparganium* spp.	SPARG
Reed, Common	*Phragmites australis*	PHAU7
Rhododendron	*Rhododendron* spp.	RHODO
Rhodora	*Rhododendron canadense*	RHCA6
Rice Cut-grass	*Leersia oryzoides*	LEOR
Rice, Wild	*Zizania aquatica*	ZIAQ
Rock-cress	*Arabis* spp.	ARABI2
Rock-cress, Lyre-leaved	*Arabis lyrata*	ARLY2
Rock-cress, Smooth	*Arabis laevigata*	ARLA
Rock-pellitory	*Parietaria pensylvanica*	PAPE5
Rose, Carolina	*Rosa carolina*	ROCA4
Rose, Multiflora	*Rosa multiflora*	ROMU
Rose, Northern Prickly	*Rosa acicularis*	ROAC
Rose, Pasture	*Rosa carolina*	ROCA4
Rose, Riverside	*Rosa blanda*	ROBL
Rose, Saltspray	*Rosa rugosa*	RORO
Rose, Smooth (Riverside)	*Rosa blanda*	ROBL
Rose, Swamp	*Rosa palustris*	ROPA
Rosemary, Bog	*Andromeda polifolia*	ANPO

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Rush, Bayonet	*Juncus militaris*	JUMI2
Rush, Canada	*Juncus canadensis*	JUCA3
Rush, Common	*Juncus effusus*	JUEF
Rush, Pondshore	*Juncus pelocarpus*	JUPE
Salt Hay	*Spartina patens*	SPPA
Saltmarsh Hay	*Spartina patens*	SPPA
Saltwort	*Salicornia* spp.	SALIC
Saltwort, Seabeach	*Salsola kali* ssp. *kali*	SAKAK
Sand Jointweed	*Polygonella articulata*	POAR4
Sandwort, Large-leaved	*Moehringia macrophylla*	MOMA3
Sandwort, Seabeach	*Honckenya peploides*	HOPE
Sarsaparilla, Bristly	*Aralia hispida*	ARHI2
Sarsaparilla, Wild	*Aralia nudicaulis*	ARNU2
Sassafras	*Sassafras albidum*	SAAL5
Saxifrage, Early	*Saxifraga virginiensis*	SAVI5
Saxifrage, Swamp	*Saxifraga pensylvanica*	SAPE8
Sea-lavender	*Limonium carolinianum*	LICA17
Sea-rocket	*Cakile edentula*	CAED
Sedge	*Carex* spp.	CAREX
Sedge, Awned	*Carex crinita*	CACR6
Sedge, Beaked	*Carex utriculata*	CAUT
Sedge, Bladder-	*Carex intumescens*	CAIN12
Sedge, Broad-leaved Woodland	*Carex platyphylla*	CAPL5
Sedge, Brome-like	*Carex bromoides*	CABR14
Sedge, Delicate	*Carex leptalea*	CALE10
Sedge, Ivory	*Carex eburnea*	CAEB2
Sedge, Long-stalked	*Carex pedunculata*	CAPE4
Sedge, Marsh	*Carex lacustris*	CALA16
Sedge, New England	*Carex novae-angliae*	CANO4
Sedge, Northern Awned	*Carex gynandra*	CAGY4
Sedge, Parasol	*Carex umbellata*	CAUM4
Sedge, Peduncled	*Carex pedunculata*	CAPE4
Sedge, Pennsylvania	*Carex pensylvanica*	CAPE6
Sedge, Plantain-leaf	*Carex plantaginea*	CAPL4
Sedge, Porcupine	*Carex hystericina*	CAHY4
Sedge, Prickly	*Carex interior*	CAIN11
Sedge, Saltmarsh	*Carex paleacea*	CAPA29
Sedge, Saltmarsh Straw	*Carex hormathodes*	CAHO8
Sedge, Slender Wooly-fruited	*Carex lasiocarpa* var. *americana*	CALAA
Sedge, Thread-leaved	*Carex eburnea*	CAEB2
Sedge, Tussock	*Carex stricta*	CAST8
Sedge, Twig	*Cladium mariscoides*	CLMA
Sedge, Water-	*Carex aquatilis*	CAAQ
Sedge, Yellow	*Carex flava*	CAFL4
Serviceberry	*Amelanchier* spp.	AMELA
Shadbush	*Amelanchier arborea*	AMAR3
Shadbush, Round-leaved	*Amelanchier sanguinea*	AMSA
Sickle-pod	*Arabis canadensis*	ARCA

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Silverrod	*Solidago bicolor*	SOBI
Skunk Cabbage	*Symplocarpus foetidus*	SYFO
Sleepy Catch Fly	*Silene antirrhina*	SIAN2
Smartweed	*Polygonum* spp.	POLYG4
Smartweed, Erect Water	*Polygonum amphibium* var. *emersum*	POAME
Snakeroot, White	*Eupatorium rugosum*	EURU6
Snowberry, Creeping	*Gaultheria hispidula*	GAHI2
Solomon's Seal, False	*Maianthemum racemosum*	MARA7
Solomon's Seal, Starry	*Maianthemum stellatum*	MAST4
Solomon's Seal, Three-leaved	*Maianthemum trifolium*	MATR4
Spearwort, Creeping	*Ranunculus flammula* var. *ovalis*	RAFLO
Sphagnum	*Spahgnum* spp.	SPHAG2
Spicebush	*Lindera benzoin*	LIBE3
Spikemoss, Rock	*Selaginella rupestris*	SERU
Spike-rush, Dwarf	*Eleocharis parvula*	ELPA5
Spike-rush, Saltpond	*Eleocharis parvula*	ELPA5
Spike-sedge	*Eleocharis* spp.	ELEOC
Spike-sedge, Deceitful	*Eleocharis fallax*	ELFA
Spike-sedge, Needle	*Eleocharis acicularis*	ELAC
Spike-sedge, Robbins'	*Eleocharis robbinsii*	ELRO
Spike-sedge, Saltmarsh	*Eleocharis rostellata*	ELRO2
Spike-sedge, Slender	*Eleocharis tenuis*	ELTE
Spike-sedge, Small's	*Eleocharis smallii*	ELPA3
Spiraea	*Spiraea* spp.	SPIRA
Spleenwort, Ebony	*Asplenium platyneuron*	ASPL
Spleenwort, Maidenhair	*Asplenium trichomanes*	ASTR2
Spring Beauty, Broad-leaved	*Claytonia caroliniana*	CLCA
Spruce, Black	*Picea mariana*	PIMA
Spruce, Red	*Picea rubens*	PIRU
Squirrel Corn	*Dicentra canadensis*	DICA
Starflower	*Trientalis borealis*	TRBO2
St. John's-wort	*Hypericum perforatum*	HYPE
St. John's-wort, Dwarf	*Hypericum mutilum*	HYMU
St. John's-wort, Marsh	*Triadenum virginicum*	TRVI2
St. John’s-wort, Pale	*Hypericum ellipticum*	HYEL
Starflower	*Trientalis borealis*	TRBO2
Strawberry	*Fragaria virginiana*	FRVI
Stiff Aster	*Ionactis linariifolius*	IOLI2
Straw-sedge, Saltmarsh	*Carex hormathodes*	CAHO8
Sumac, Poison	*Toxicodendron vernix*	TOVE
Sumac, Staghorn	*Rhus typhina(hirta)*	RHHI
Sumac, Winged	*Rhus copallinum*	RHCO
Sundew	*Drosera* spp.	DROSE
Sundew, Round-leaved	*Drosera rotundifolia*	DRRO
Sundew, Spatulate-leaved	*Drosera intermedia*	DRIN3
Sundew, Thread-leaved	*Drosera filiformis*	DRFI
Sunflower, Woodland	*Helianthus divaricatus*	HEDI2
Swamp-candles	*Lysimachia terrestris*	LYTE2

LIST OF COMMON NAMES, SCIENTIFIC NAMES, AND SPECIES CODES FOR PLANTS LISTED IN THIS GUIDE (CONTINUED)

Common Name [1]	Scientific Name [2]	Species Code [3]
Sweet Cicely	*Osmorhiza claytonii*	OSCL
Sweet Fern	*Comptonia peregrina*	COPE80
Sweet Flag	*Acorus calamus*	ACCA4
Sweet Gale	*Myrica gale*	MYGA
Switchgrass, Coastal	*Panicum virgatum ssp. spissum*	PAVIS
Switchgrass, Saltmarsh	*Panicum virgatum* var. *spissum*	PAVIS
Switchgrass, Seaside	*Panicum virgatum*	PAVI2
Sycamore	*Platanus occidentalis*	PLOC
Tamarack (Larch)	*Larix laricina*	LALA
Tapegrass	*Vallisneria americana*	VAAM3
Tea, Labrador	*Ledum groenlandicum*	LEGR
Tearthumb	*Polygonum arifolium*	POAR6
Tearthumb, Arrow-leaf	*Polygonum sagittatum*	POSA5
Threesquare, Common	*Scirpus pungens*	SCPU3
Threesquare, Saltmarsh	*Scirpus americanus*	SCAM2
Ticklegrass, Southern	*Agrostis hyemalis*	AGHY
Tick-trefoil, Cluster-leaf	*Desmodium glutinosum*	DEGL5
Tick-trefoil, Panicled	*Desmodium paniculatum*	DEPA6
Toadflax, Bastard	*Comandra umbellata*	COUM
Toothwort	*Dentaria diphylla*	DEDI6
Touch-me-not	*Impatiens capensis*	IMCA
Touch-me-not, Spotted	*Impatiens capensis*	IMCA
Trillium	*Trillium* spp.	TRILL
Trillium, Painted	*Trillium undulatum*	TRUN
Trout-lily	*Erythronium americanum*	ERAM5
Tupelo	*Nyssa sylvatica*	NYSY
Tussock-sedge	*Carex stricta*	CAST8
Twig-sedge	*Cladium mariscoides*	CLMA
Twinflower	*Linnaea borealis*	LIBO3
Usnea	*Usnea* spp.	USNEA2
Venus' Looking Glass	*Triodanis perfoliata*	TRPE4
Viburnum, Maple-leaf	*Viburnum acerifolium*	VIAC
Violet, Arrow-leaf	*Viola sagittata*	VISA2
Violet, Bird's Foot	*Viola pedata*	VIPE
Violet, Early Yellow	*Viola rotundifolia*	VIRO2
Violet, Lance-leaf	*Viola lanceolata*	VILA4
Violet, Three-lobed	*Viola triloba*	VIPA3
Virginia Creeper	*Parthenocissus quinquefolia*	PAQU2
Water Hemlock	*Cicuta maculata*	CIMA2
Water-horehound, Northern	*Lycopus uniflorus*	LYUN
Water-lily, White	*Nymphaea odorata*	NYOD
Water-lily, Yellow	*Nuphar variegata*	NUVA2
Water Parsnip	*Sium suave*	SISU2
Water Purslane	*Ludwigia palustris*	LUPA
Water-sedge	*Carex aquatilis*	CAAQ

LIST OF COMMON NAMES, SCIENTIFIC NAMES, AND SPECIES CODES FOR PLANTS LISTED IN THIS GUIDE (CONTINUED)

Common Name [1]	Scientific Name [2]	Species Code [3]
Water-plantain, Large	*Alisma plantago-aquatica* var. *americanum*	ALPLA
Water-plantain, Lesser	*Alisma plantago-aquatica* var. *parviflorum*	ALPLP
Waterweed	*Elodea nuttallii*	ELNU2
Water-willow	*Decodon verticillatus*	DEVE
Waterwort	*Elatine minima*	ELMI
Widgeon-grass	*Ruppia maritima*	RUMA5
Wild Calla	*Calla palustris*	CAPA
Wild Coffee	*Triosteum aurantiacum*	TRAU4
Wild Ginger	*Asarum canadense*	ASCA
Wild Leek	*Allium tricoccum*	ALTR3
Wild Raisin	*Viburnum nudum cassinoides*	VINUC
Wild Rye, Weigand's	*Elymus wiegandii*	ELWI
Willow	*Salix* spp.	SALIX
Willow, Autumn	*Salix serissima*	SASE2
Willow, Black	*Salix nigra*	SANI
Willow, Hoary	*Salix candida*	SACA4
Winterberry	*Ilex verticillata*	ILVE
Winterberry, Common	*Ilex verticillata*	ILVE
Winterberry, Smooth	*Ilex laevigata*	ILLA
Wintergreen	*Gaultheria procumbens*	GAPR2
Witch-hazel	*Hamamelis virginiana*	HAVI4
Wood-aster, White	*Aster divaricatus*	ASDI
Wood-aster, Whorled	*Aster acuminatus*	ASAC6
Wood-fern, Blunt-lobed	*Woodsia obtusa*	WOOB2
Wood-fern, Crested	*Dryopteris cristata*	DRCR4
Wood-fern, Intermediate	*Dryopteris intermedia*	DRIN5
Wood-fern, Marginal	*Dryopteris marginalis*	DRMA4
Wood-fern, Spinulose	*Dryopteris carthusiana*	DRCA11
Woodland-sedge, Broad-leaved	*Carex platyphylla*	CAPL5
Wood-nettle	*Laportea canadensis*	LACA3
Wood-sorrel	*Oxalis montana (= acetosella)*	OXAC3
Wood-sorrel, Mountain	*Oxalis montana (= acetosella)*	OXAC3
Yew, Canada	*Taxus canadensis*	TACA7

1. Common names from Swain and Kearsley (2001), then verified using Sorie and Somers (1999.)
2. Scientific names from Swain and Kearsley (2001), then verified using Sorie and Somers (1999.)
3. Plant codes from USDA, NRCS (2004.

State Rankings of Massachusetts' Natural Communities[1]

S1 Communities	S2 Communities	S3 Communities
Black Gum – Pin Oak – Swamp White Oak Perched Swamp	Alluvial Atlantic White Cedar Swamp	Acidic Graminoid Fen
Calcareous Basin Fen	Atlantic White Cedar Bog	Acidic Shrub Fen
Coastal Plain Pondshore – Inland Variant	Brackish Tidal Marsh	Alluvial Hardwood Flat
Fresh/Brackish Tidal Shrubland	Calcareous Pondshore/Lakeshore	Alluvial Red Maple Swamp
Fresh/Brackish Tidal Swamp	Calcareous Rocky Summit/Rock Outcrop	Calcareous Rock Cliff
Freshwater Tidal Marsh	Calcareous Seepage Marsh	Circumneutral Rock Cliff
High Elevation Spruce – Fir Forest/Woodland	Calcareous Sloping Fen	Coastal Plain Pondshore
Maritime Juniper Woodland/Shrubland	Coastal Atlantic White Cedar Swamp	High-energy Riverbank
Maritime Pitch Pine Woodland on Dunes	Coastal Salt Pond	Kettlehole Wet Meadow
Northern Atlantic White Cedar Swamp	Cobble Bar Forest	Level Bog
Oak – Tulip Tree Forest	Hickory – Hop Hornbeam Forest/Woodland	Maritime Beach Strand
Sandplain Grassland	High-energy Rivershore Meadow	Maritime Dune
Sandplain Heathland	High-terrace Floodplain Forest	Maritime Shrubland
Sea-level Fen	Inland Atlantic White Cedar Swamp	Open Oak Forest/Woodland
Yellow Oak Dry Calcareous Forest	Interdunal Marsh/Swale	Rich Conifer Swamp
	Kettlehole Level Bog	Rich, Mesic Forest
	Major-river Floodplain Forest	Riverside Rock Outcrop
	Maritime Erosional Cliff	Salt Marsh
	Maritime Forest/Woodland	Seagrass
	Maritime Rock Cliff	Sugar Maple – Oak – Hickory Forest
	Open Talus/Coarse Boulder	Black Oak – Scarlet Oak Woodland (S3/S4)
	Pitch Pine – Scrub Oak	Circumneutral Rocky Summit/Rock Outcrop (S2/S3)
	Red Maple – Black Ash – Bur Oak Swamp	
	Red Maple – Black Ash – Tamarack Calcareous Seepage Swamp	
	Red Maple – Black Ash Swamp	
	Red Maple – Black Gum Swamp	
	Ridgetop Pitch Pine – Scrub Oak	
	Ridgetop Heathland	
	Riverside Seep	
	Sandplain Grassland – Inland Variant	
	Sandplain Heathland – Inland Variant	
	Scrub Oak Shrubland	
	Small-river Floodplain Forest	
	Spruce – Tamarack Bog	
	Transitional Floodplain Forest	
	Circumneutral Rocky Summit/Rock Outcrop (S2/S3)	

State Rankings of Massachusetts' Natural Communities (continued)[1]

S4 Communities	S5 Communities	Unranked Communities
Acidic Rock Cliff	Mixed Oak Forest/Woodland	Acidic Graminoid Fen – Spillway Fen
Acidic Rocky Summit/Rock Outcrop	Northern Hardwoods – Hemlock – White Pine Forest	Cultural Grassland
Acidic Pondshore/Lakeshore	Oak – Hemlock – White Pine Forest	River and Lake Drawdown
Chestnut Oak Forest/Woodland	Shrub Swamp	
Coastal Forest/Woodland	Successional Northern Hardwood Forest	
Deep Emergent Marsh	Successional White Pine Forest	
Dry, Rich Oak Forest/Woodland	White Pine – Oak Forest	
Freshwater Mud Flat		
Forest Seep		
Hemlock Forest		
Hemlock Swamp		
Highbush Blueberry Thicket		
Low-energy Riverbank		
Marine Intertidal Gravel/Sand Beach		
Marine Intertidal Rocky Shore		
Oak – Hickory Forest		
Pitch Pine – Oak Forest/Woodland		
Red Oak – Sugar Maple Transition Forest		
Riverine Pointbar and Beach		
Shallow Emergent Marsh		
Spruce – Fir - Northern Hardwoods Forest		
Wet Meadow		
Black Oak – Scarlet Oak Woodland (S3/S4)		

[1.] Swain and Kearsley (2001).

Natural Community Ranks

Each type of natural community is assigned an "element rank", based on the species element ranking developed for the Natural Heritage system by The Nature Conservancy and maintained by NatureServe. The state rank (S) reflects the rarity and threat within Massachusetts. Every state assigns its own "S" rank based on the rarity and threat within that state, with regard to regional conditions. Global ranks for communities are not included because Massachusetts' classification system is different from the US National Vegetation Classification system.

S1 = Critically Imperiled in Massachusetts —Critically imperiled in the state because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very few remaining acres or miles of stream or other factors making it especially vulnerable to extirpation from the state.

S2 = Imperiled in Massachusetts —Imperiled in the state because of rarity (typically 6 -20 occurrences), very restricted range, few remaining acres, or miles of stream or other factors making it very vulnerable to extirpation from the state.

S3 = Vulnerable in Massachusetts—Vulnerable due to a restricted range, relatively few occurrences (often 80 or fewer), limited acreage, or miles of stream, recent and widespread declines, or other factors making it vulnerable to extirpation from the state.

S4 = Apparently Secure in Massachusetts —Uncommon but not rare; some cause for long-term concern due to declines or other factors.

S5 = Secure in Massachusetts —Common, widespread, and abundant in the state.

S#S# = Range Rank—A numeric range rank (e.g., S2S3) is used to indicate the range of uncertainty in the status of a species or community.

Natural Heritage & Endangered Species Program

Massachusetts Natural Heritage & Endangered Species Program
Division of Fisheries & Wildlife
Route 135
Westborough, MA 01581
(508) 792-7270 ext. 200

FORM 2: NATURAL COMMUNITY SUMMARY AND RANKING

rev. June 2006

(A location map must accompany this form.)

A. Identifiers:

Community Name (MNHESP: Swain & Kearsley, 2000): _____

NatureServe Association Name (Optional): _____

Survey Date: _____ Today's Date: _____

Survey Site Name: _____

Surveyor Name(s): _____

Best Source (Field survey or secondary source used to complete this form, **NHESP use**): _____

_____

Transcriber (**NHESP use only**. YY-MM-DD XXX): _____ Town Name: _____

Directions to site: _____

_____

_____

GPS Point(s)___Yes___No___ Latitude _____ Longitude _____

B. Community Description:

Vegetation Description (*EODATA*: **Summarize** the vegetation: dominant and/or characteristic species, indicator species, community structure, variants/microhabitat features, unvegetated surface; spatial distribution (i.e., size, number, and separation distance of patches); intact natural processes, geology, hydrology, topography, and soil properties, especially if relevant to the community identification): _____

_____

_____

_____

_____

_____

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_____

_____

_____

_____

_____ Estimated size (acres) GIS Acres (if available) _____

Physical Description (*GENDESC*: Describe the landscape surrounding the community, including the natural area. Both within and surrounding the community, describe: physical structures and land use practices; natural disturbances; embedded, adjacent, and nearby natural communities including aquatic features; notable landforms; scenic qualities): _____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Is community on conservation land (if known): _____ Managed Area Name: _____

Evidence of Disturbance/Threats to the Community/Management Recommendations (*MGMTCOM*: Describe the anthropogenic disturbances that have decreased the quality and viability of the community such as hydrologic alterations (ditching, damming, erosion etc.), logging, mining, livestock grazing, plantations, orchards, structures, trampling, and exotic flora or fauna within and surrounding the community. Discuss threats to the site and management implications.):_____

_____

_____

_____

_____

_____

Recreational Use (evidence of ATV's, ORV's, mountain bikes, horses, walking trails, etc.):

_____

Protection Comments (*PROTCOM*: Comment on the legal protectability of the site): _____

_____

_____

General Comments (*COMMENTS*: Note the type of sampling done; observation point (form 1), releve plot (form 3), plant list, etc.; note any additional field work needed. Comment on questionable identification.):_____

_____

_____

_____

_____

Owner's Name (if known):_____ Telephone: (__)_____

Address: _____

Is Owner: aware of community? __yes _no __unknown; Protecting community? __yes __no __unknown

Owner Comments (*OWNERCOM*: e.g., contact owner prior to visiting the site): _____

_____

C: Community Element Occurrence Ranking: (Refer to community ranking specifications for assistance.)

Community Size Rank: (Compare relative size to other known occurrences, configuration, patchiness)

A – Excellent **B** – Good **C** – Marginal **D** - Poor

Comments: _____

Community Condition Rank: (Consider development/maturity (e.g., old growth), abiotic condition, species and physiognomic diversity, ecological processes, abundance of exotic species, internal connectivity, degree of anthropogenic disturbance including fragmentation).

A – Excellent **B** – Good **C** – Marginal **D** - Poor

Comments: _____

Community Landscape Context Rank: (Consider the size and connectivity of the natural landscape, the position of the community within the landscape, and the landscape condition)

A – Excellent **B** – Good **C** – Marginal **D** - Poor

Comments: _____

Community EO Rank: (What are the long-term prospects for continued existence of this occurrence at the indicated level of quality? A summary of all factors listed above. Explain the basis of your ranking: range wide, state wide, or locally.)

A – Excellent **B** – Good **C** – Marginal **D** - Poor

Comments (*EORANKCOM:* Summarize the above and justify the EO Rank assigned): _____

_____

_____

_____

Other rare species and/or natural communities observed at this site (**NHESP use**) T/U = Transcribed/Updated?):

	SPECIES OR COMMUNITY	T/U?		SPECIES OR COMMUNITY	T/U?
1			4		
2			5		
3			6		

Natural Heritage & Endangered Species Program

Natural Heritage & Endangered Species Program
Massachusetts Division of Fisheries & Wildlife
1 Rabbit Hill Road
Westborough, MA 01581
(508) 389-6360

Instructions for Natural Community Form 2

A. Identifiers

Community Name: put in what you think the community type is. This may be changed by NHESP based on your description and our interpretation of it.

NatureServe Association or System: Definitely optional.

Survey Date: Date(s) that you went to the site. Multiple days are possible: May 2-23, 2013; Summer 2013; or even "many dates 2005 through 2012" – but include a 'most recent date'.

Today's Date: the date you finish filling out the field form.

Survey Site Name: can be left blank, or a big site such as "Myles Standish State Forest" or a more localized such as "MSSF around College Pond," or something that works for you. It's meant to help find the area.

Surveyor Name(s): list everyone who helped describe the natural community occurrence.

Best Source: the name of the person who is responsible for the form, including contact information.

Transcriber: IGNORE this field

Town Name: Put in the name of the town(s) where the natural community site occurs.

Directions to site: This is important. Not just a GPS point. Put in where to park, how to access the area, whether there are trails or to follow a compass line.

GPS Point(s) circle Yes or No (or write a Y or N). Put in the best latitude and longitude. [Note: if you have multiple lat/longs, make a table and put it on the map page. Include Waypoint ID, latitude, longitude, and date/time they were taken. These should be identified on the associated map].

B. Community Description

Vegetation Description: This is a description of the vegetation that is seen at the site, usually at the middle or best area, but with reference to variation noted and changes at the edges. Species seen and their relative abundances should be described. At least 3 tree species (when there are any) should be listed with their coverage relative to the whole area. Say there aren't any if there aren't, or note if they are clustered or scattered. Note if there are multiple heights of trees, and the size of the diameters (general categories are fine, such as, about 8 inches, or most are about 4 inches in diameter). The shrub layer should also have at least the dominant species and their cover noted. Note clustering, openings, and other structural variations. The herbaceous layer should have the most common, and perhaps any uncommon species noted. The percent cover of the whole layer should be noted, and then individual species with the relative abundance of each species. Most herbaceous layers have many species, most with very low cover. They don't all have to be listed, although it adds information to include as many as possible. Species groups can be given: grasses or sedges, for example. Note that height defines the layer, so tree seedlings can be in the herbaceous or even shrub layer.

Estimated Size: Include your best guess as to acreage, if you want to. Not required.

GIS Acres: NHESP will take this from the map when data are considered for the NHESP database.

Physical Description: As on the form, include a description of the landscape surrounding the community occurrence. Describe slope direction, steepness, rock outcrops, downed wood, standing snags, closeness to a stream/pond/wetland/forest, and other features of the community occurrence. Include if there are stumps from cutting, wolf (open grown) trees in a forest, wood roads, stonewalls, and other signs of past land use. Most of these latter observations should also be in the Evidence of Disturbance section on page 2.

Is community on conservation land? (if known). Yes or No

Managed Area Name: give the property name, or type. State (which agency), Municipal conservation land, local land trust – provide the name of the property if you know it, but at least the type is useful.

Page 2.

Evidence of Disturbance/Threats to the Community/Management Recommendations: As noted on the form, describe disturbances that you see. Some may have been put into the physical description, repeat here if there is more detail. Note proximity to roads, houses, campgrounds, current uses that may affect the natural community. Include observations and suggestions on management. Note effects (such as erosion, wetland disturbances, tree removal…) from activities in the next field.

Recreational Use: May not be very different from the previous field which is intended to include the results of activities listed here.

Protection Comments: Optional. Applies to land not already in conservation ownership. Mostly it refers to how big a property might be and whether conservation ownership would be practical (for example small occurrences in development might not make sense for acquisition by a statewide conservation group).

General Comments: Optional. As noted on the form, comments can include the type of sampling. Comments can also include whether the area sampled was part of a larger community occurrence. Or other relevant notes.

Owner's Name and telephone and address: Include if known.

Owner Comments: Optional. Include notes that might help a subsequent surveyor, if relevant.

C. Community Element Occurrence Ranking -- DO THIS. NHESP will re-evaluate the ranks you provide but your input is useful.

The ranking is very important. While someone filling out a form may not have statewide experience for comparison, (please say so if that is the case) they have generally looked at communities throughout their area. Keep in mind that NHESP may revise the ranks submitted, but your input will guide that. Please use the comment fields!

There are 3 categories to consider when ranking natural communities.

Size: relative to other occurrences of the type of natural community, includes fragmentation, natural patchiness, and configuration (are the edges impacted by surrounding activities?).

Condition: Are the expected native species present in about the expected abundances? Are natural processes able to function (if a floodplain, is there flooding?, if a pitch pine/scrub oak community, can fire occur?, if a forest interior, is there surrounding forest buffer?)? Are there invasive exotic species? If so, at what abundance? (few, occasional, abundant, large patches, …).

Landscape Context: Evaluate the landscape noting nearby development including roads, fragmentation of the community, and uses of surrounding land including buffer from development.

Then summarize: Community EO Rank (EO = Element Occurrence, NHESP jargon for the Community occurrence (or could be a species occurrence if it were a rare species form): Summarize the Size, Condition, and Landscape ranks while considering the long term prospects for the long term continuation of the occurrence at the current quality.

Other rare species and/or natural communities observed at this site: Optional, fill in only if you actually see and report on an additional uncommon natural community, or a rare species.

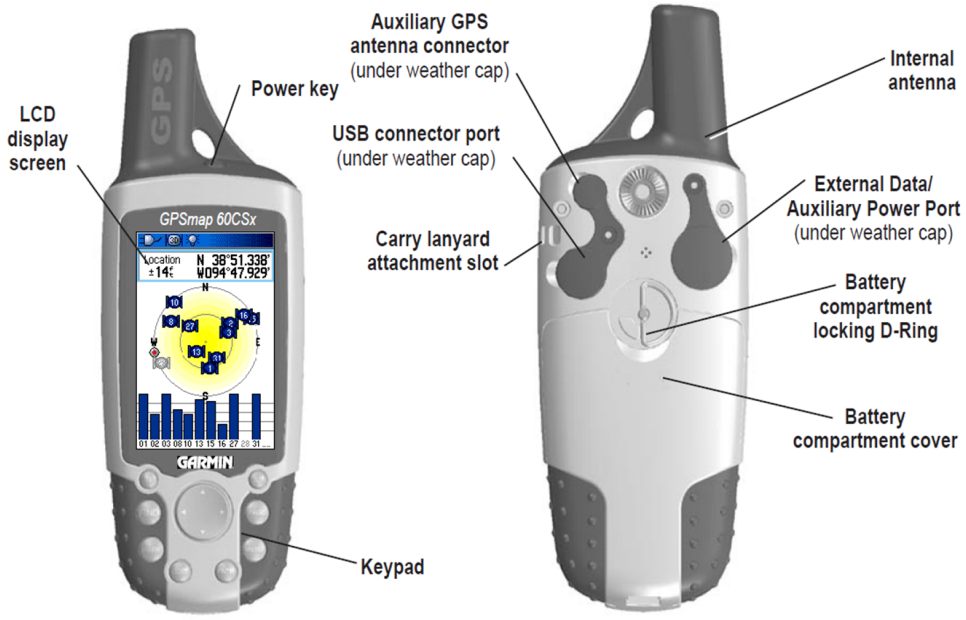
Page3: Maps, required. Attach or insert map(s) of the area, WITH A BOUNDARY shown for the community occurrence. Show GPS points and tracks. At least one map must be at 1:12,000 scale and show road names, pond names, and/or other identifiable features. Preferred format would be a topo map and an aerial. GoogleEarth maps with road names are acceptable. ALSO provide the GPS points and community boundary electronically.

Page 4: Photos, required. Attach or insert photos (a few) of the Community Occurrence. Label the photos with photographer's name, date taken, and where taken. Include information on why each photo is included. (For example: Photo of Pitch Pine/Scrub Oak Community occurrence at Wings Hole, from the western edge towards the center, showing the variation in shrub layer. Or: Photo of Atlantic White Cedar Swamp from the center towards the upland, showing hummocks and hollows.)

The GPS Unit

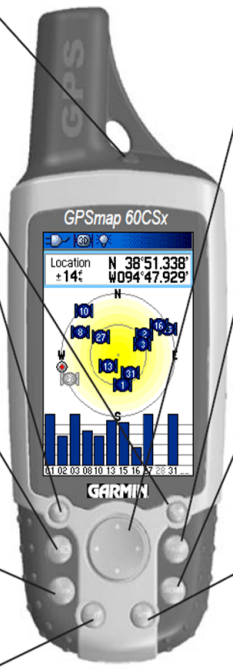
Getting Started

Unit Overview



The GPS Unit

Using the GPSMAP 60CSx Keypad



POWER Key

- Press and hold to turn the unit on or off.
- Press and release to adjust the backlighting.

IN/OUT Zoom Keys

- Press to zoom in or out on the Map Page.
- Press to scroll up or down a list on any other page.

FIND/MOB Key

- Press and release at any time to view the Find Menu.
- Press and hold for MOB*

MARK Key

- Press and release at any time to mark your current location.

QUIT Key

- Press and release to cancel data entry or exit a page.

ROCKER Key

- Press up, down, left, or right to highlight options and to enter data, or move the map panning arrow.

PAGE/COMPASS Key

- Press and release to cycle through the main pages.
- Press and hold to turn the compass on or off

MENU Key

- Press and release to view page options.
- Press twice to view the Main Menu.

ENTER Key

- Press and release to enter highlighted options, data or confirm on-screen messages.

* Man Overboard (MOB) feature stores a waypoint and then navigates back to it.

Google Earth Pro

You will first have to download GoogleEarth Pro, a free program available at google.com/earth/

"Username" is your email address
"License Key" is now universally "GEPFREE"

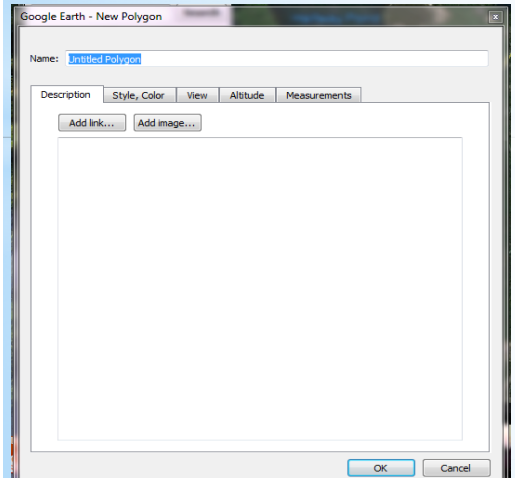
You can now download tracks/layers from the web and upload your own tracks and waypoints!

Uploading Your Track

1. **Open Google Earth Pro**
2. **Connect the Garmin to your computer via the USB port**
3. **Go to "File" → "Import"**
4. **This will import your Current Track and automatically zoom in to it on the map**

Creating Shapefiles

Add a Polygon by clicking this button in the top toolbar



The box to the left will appear and your cursor symbol will become a box. Hold left-click to trace your track or the approximate boundaries of the community you surveyed

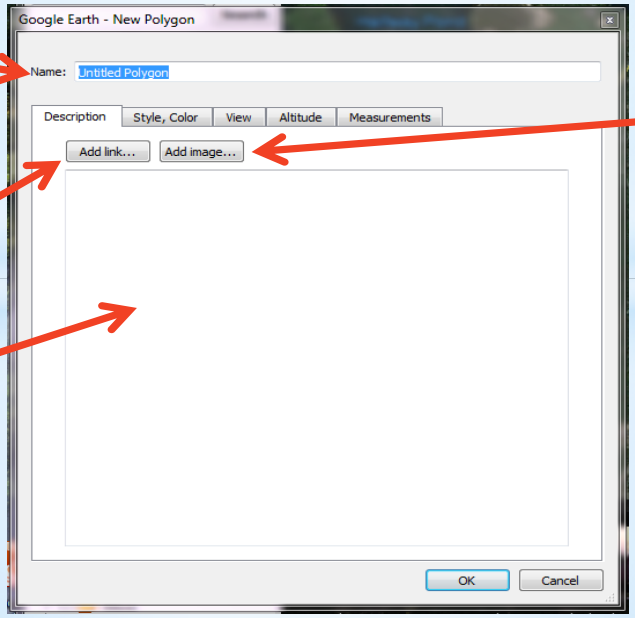
***These will be *approximate*, and that is OK, it is just to give a general idea of where the community is located**

Formatting Shapefiles

Name for your purposes

Add link to land owner's website if applicable

Write survey information in the description (date, time, how long you were out) and take note of anything significant



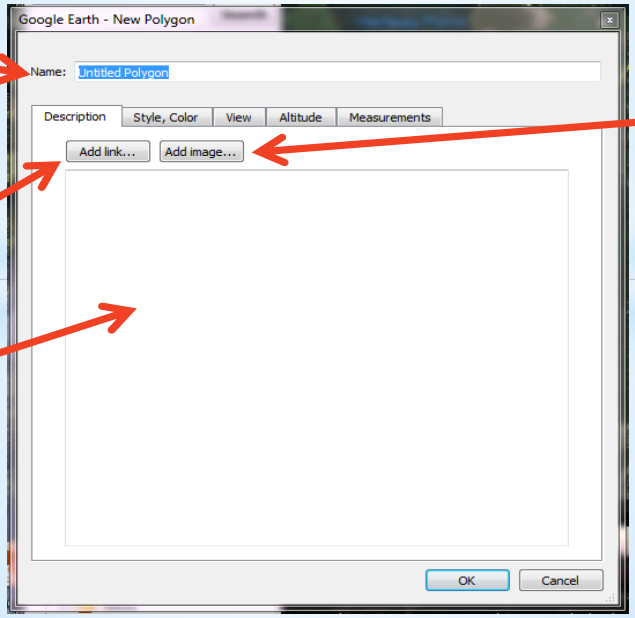
Unfortunately, you can only link images from the web to a shapefile. To do this you would have to upload your pictures to a website (such as Flickr or Facebook) then copy the link. You can do this, or upload the .jpg file on the reporting form

Formatting Shapefiles

Name for your purposes

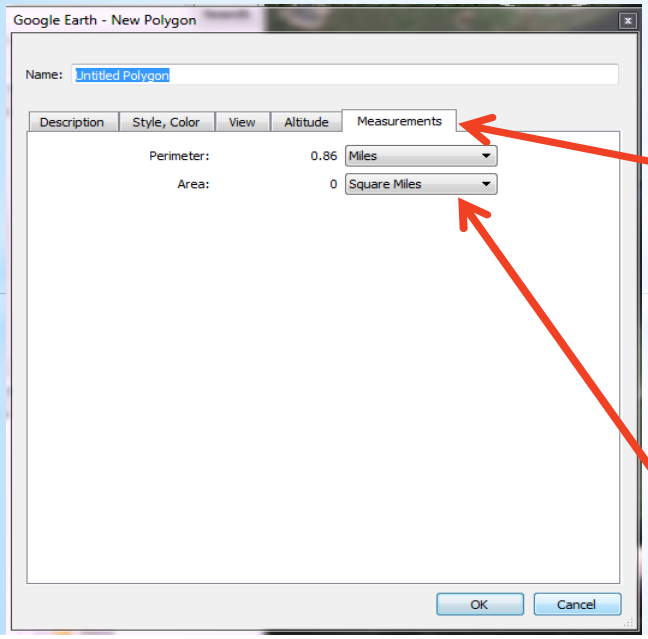
Add link to land owner's website if applicable

Write survey information in the description (date, time, how long you were out) and take note of anything significant



Unfortunately, you can only link images from the web to a shapefile. To do this you would have to upload your pictures to a website (such as Flickr or Facebook) then copy the link. You can do this, or upload the .jpg file on the reporting form

Formatting Shapefiles



Go to the "Measurements" tab to find the acreage of the surveyed community. This is necessary for the reporting form

Make sure to record area in acreage, NOT square miles (which is the default setting)

Sharing your Shapefiles

1. Right Click on the Polygon
2. Select “Save Place As”
3. File name: Area_Name.Town.Your_Name.MMDDYY
   (ex. Halfway_Pond.Plymouth.Anthony_Serra.061316)
   *NB: Use underscores NOT spaces
4. Under “Save as type” select “Kml (*.kml)”
5. Upload the .kml file to the reporting form

This will also save and share anything you wrote in the description and any pictures or links you added.

Submitting Data

Please upload your data using the Online version of the MNHESP
Field Form 2 at:
at

https://pinebarrensalliance.org/programs/natural-communities-identification-training/

Tip:
Photos and map files must be uploaded to the Google Drive folders found at the links provided in the appropriate questions.

Need help?
Call the Southeastern Massachusetts Pine Barrens Alliance at (774) 773–9982
or Email us at info@pinebarrensalliance.org.

We are here to help!

MNHESP Natural Communities Online Plant Guide

http://naturalcommunities.info

Need help?
Call the Southeastern Massachusetts Pine Barrens Alliance at (774) 773–9982
or Email us at info@pinebarrensalliance.org.

We are here to help!