

NON-FORESTED
($< 50\%$ tree canopy)

MARSHES/WET MEADOWS (Herbaceous dominated)

Page 61

- Coastal 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 66

- Inland Acidic Pondshore/Lakeshore
- Coastal Plain Pondshore
- Calcareous Pondshore/Lakeshore

RIVERSIDES/STREAMSIDES (Adjacent to flowing fresh water)

Page 69

- Mud Flat
- Low-Energy Riverbank
- Riverside Seep
- High-Energy Riverbank
- Riverine Pointbar and Beach

SHRUB SWAMPS (Shrub dominated)

Page 73

- 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 74)

Calcareous Sloping Fen
Calcareous Seepage Marsh
Calcareous Basin Fen

ACIDIC PEATLANDS (Acidic conditions with sphagnum)
(Page 77)

Acidic Graminoid Fen
Acidic Shrub Fen
Sea-Level Fen (Theoretical Occurrence)
Level Bog
Kettlehole Level Bog
Highbush Blueberry Thicket

VERNAL POOLS

Page 83

Woodland Vernal Pool

FORESTED
(>50% tree canopy)

CONIFER DOMINATED

Page 84

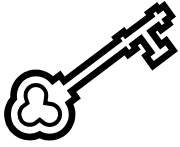
Hemlock-Hardwood Swamp
Coastal Atlantic White Cedar Swamp
Inland Atlantic White Cedar Swamp
Alluvial Atlantic White Cedar Swamp
Atlantic White Cedar Bog
Spruce - Tamarack Bog
Spruce - Fir Boreal Swamp
Northern Atlantic White Cedar Swamp

HARDWOOD DOMINATED

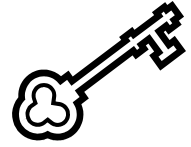
Page 91

Red Maple Swamp
Alluvial Red Maple Swamp
Small-River Floodplain Forest
Black Ash Swamp
High-Terrace Floodplain Forest
Black Ash - Red Maple - Tamarack Calcareous Seepage
Black Gum - Pin Oak - Swamp White Oak "Perched" Swamp
Black Gum Swamp
Major-River Floodplain Forest
Transitional Floodplain Forest
Cobble Bar Forest


MARSHES/WET MEADOWS COMMUNITIES



Shortcut Key: Check full descriptions following use



- | | |
|---|---|
| 1. Located in shallow depressions among sand dunes. | A. Yes – Coastal 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 |

	<p>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.</p> <p>Use hydrology, location, and community descriptions to identify the correct Marshes/Wet Meadows community.</p>
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- 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
Coastal 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
Coastal 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

Coastal Interdunal Marsh Swale

S1

Description/Concept	Graminoid or shrub dominated community occurring in shallow basins (swales) between sand dunes . Either shrub or graminoid dominated.
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 may occur.
Sub-canopy	
Shrub layer	SHRUB-DOMINATED COMMUNITY: Large cranberry (often >90% cover); bayberry. Scattered sheep laurel may occur.
Herb layer	SHRUB-DOMINATED COMMUNITY: Rushes, thread-leaved sundews, beak sedges, yellow-eyed grasses, St. John's-wort, southern bog clubmoss, and orchids. GRAMINOID DOMINATED: Rushes, beak sedges, and other graminoids. Plymouth gentian may occur.
Leaf litter	

Deep Emergent Marsh

S4

Description/Concept	Tall graminoid/emergent herbaceous wetlands occurring in saturated, mucky mineral soils that are seasonally inundated and permanently saturated. Water depth between 0.5 - 6 ft.
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	
Herb layer	Broad-leaved cat-tail, phragmites, wool grass, common three-square, Canada bluejoint, rice cutgrass, tussock-sedge. Herbaceous associates include arrow-leaf tear-thumb, bulblet water-hemlock, swamp-candles, beggar ticks, bedstraw, common arrowhead, slender-leaved goldenrod, and marsh fern.
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 <0.5 ft. 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	
Herb layer	Cat-tails, phragmites, and wool-grass occur but never dominate. Tussock forming species (tussock-sedge and Canada bluejoint) form a hummock-hollow topography. Typically has a mixture of bur-reeds, sedges, and rice cut-grass. Floating leaved plants (e.g., water lilies) and submergents (e.g., pondweeds) occur in open areas. Duckweed common in still water. Scattered shrubs (e.g., alder and <i>Spiraea</i>) common in old beaver flowages.
Leaf litter	

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

Wet Meadow

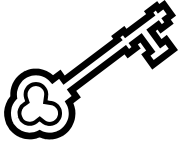
S4

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.
Topography	Occur in lake basins, wet depressions, along streams, sloughs, and other backwater areas.
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, slender woolly-fruited sedge, slender spike sedge, stalked wool-grass, rice cut-grass, and brown beak-sedge. Characteristic herbaceous associates: erect water smart weed, pickerel-weed, river horsetail, nodding bur-marigold, spotted Joe-Pye-weed, northern blue flag, and sweet flag.
Herb layer	
Leaf litter	

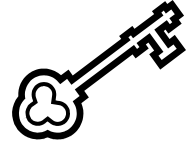
Kettlehole Wet Meadow

S3

Description/Concept	<p>Graminoid/emergent herbaceous or mixed shrub/herbaceous communities restricted to small (usually <5 acres) seasonally inundated, kettle depressions in sandy glacial outwash.</p> <p>A variant of wet meadows.</p> <p>Seasonally inundated by local runoff and ground water fluctuations.</p> <p>For most of summer they look like shallow ponds, but by late summer are covered by emergent vegetation.</p> <p>Zonation; characterized by a series of plant associations along a gradient from higher (i.e., drier) to lower (i.e., wetter.)</p> <p>Sedges and rushes dominate.</p>
Topography	Kettleholes.
Soils/Substrate	<p>Sandy outwash soils.</p> <p>Shallow, mucky peats.</p>
Canopy	Red maple may occur along fringe.
Sub-canopy	
Shrub layer	Typically fringe community, species include: leatherleaf, highbush blueberry, buttonbush, and water-willow.
Herb layer	<p>Characteristic species: Canada rush, pondshore rush, bayonet rush, needle spike sedge, Small's spike sedge, Torrey's bullsedge, and <i>Carex</i> spp.</p> <p>Shorter plants (e.g., pipeworts) grow beneath cover of sedges and rushes.</p> <p>Other occurring plants: creeping bent grass, arrowhead, nodding bur-marigold, beggar's ticks, and common St. John's-wort.</p> <p>Wettest, muckiest areas have floating-leaved aquatic plants, including: white water-lily and mermaid weed.</p> <p>When water levels are high, mannagrass is common with yellow pond-lily and pickerel-weed in deeper areas.</p> <p>Common meadow beauty and sphagnum moss also grow along edges.</p>
Leaf litter	

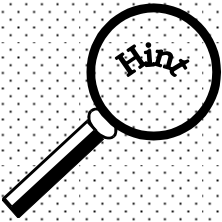


PONDSHORES/LAKESHORES COMMUNITIES



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 – Inland Acidic Pondshore/Lakeshore
4. Pondshore vegetated, with vegetation arranged in concentric circles, corresponding to changes in water level.
A. Yes – Coastal Plain Pondshore

	<p>When determining Pondshores/Lakeshores communities look at the shore's substrate; is it vegetated or is it made up of exposed sediments?</p> <p>Vegetated shores with identifiable concentric patterns of vegetation are an indication of a Coastal Plain Pondshore.</p> <p>In most of Massachusetts the default community will be the Inland Acidic Pondshore/Lakeshore.</p>
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Descriptions of Pondshores/Lakeshores Communities

Calcareous Pondshore/Lakeshore

S2

Description/Concept	This is a probable community type, with <u>no information</u> on the occurrence of this community in Massachusetts. Sparsely vegetated exposed gravelly, sandy, or muddy shores of calcareous or circumneutral, inland lakes and ponds that experience seasonal drawdown of water levels. Submerged or saturated for a significant part of the year, or continuously in wet years. Plants of this community emerge during low water periods.
Topography	Inland lake and pond basins.
Soils/Substrate	Gravel, sand, or mud.
Canopy	
Sub-canopy	
Shrub layer	
Herb layer	No information.
Leaf litter	

Inland Acidic Pondshore/Lakeshore

S4

Description/Concept	Sparsely vegetated exposed gravelly, sandy, or muddy shores of acidic, inland lakes and ponds that experience seasonal drawdown of water levels. Submerged or saturated for a significant part of the year, or continuously in wet years. Plants of this community emerge during low water periods. Vegetative cover sparse, composition variable.
Topography	Inland lake and pond basins.
Soils/Substrate	Gravel, sand, or mud.
Canopy	
Sub-canopy	
Shrub layer	
Herb layer	Graminoids, such as: Philadelphia, flat-stemmed, and fall panic grass; southern ticklegrass, rice cut-grass, lakeshore hemicarpha, autumn fimbry, and awned flatsedge. Associated herbs include: northern water horehound, beggars-ticks, slender gerardia, and golden pert.
Leaf litter	

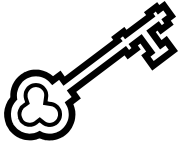
NOTE: According to Swain and Kearsley (2001), this community is not known from Boston Basin, Narragansett/Bristol Lowland, or Cape Cod/Long Island sub-ecoregions. However, these pondshores clearly occur along the coastal plain (e.g., Mashpee-Wakeby Pond, Mashpee, Upper Mill Pond, Brewster.)

Coastal Plain Pondshore

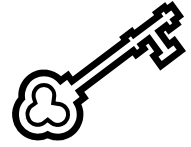
S2

Description/Concept	<p>Herbaceous communities of exposed pondshores. Most commonly in Southeastern Massachusetts., Cape Cod, and the Islands, as well as the Connecticut River Valley. In Southeastern Massachusetts occurs in areas of oak and oak/pine forests. 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.</p>
Topography	Shallow groundwater ponds in glacial outwash, usually with no inlet or outlet.
Soils/Substrate	Variable, from sand-cobble to muck.
Canopy	Adjacent, upland oak forest.
Sub-canopy	
Shrub layer	Borders the shore, dominated by highbush blueberry; associated with sweet pepper-bush and catbrier.
Herb layer	<p>Emergent exposed pondshore dominated by coastal flat-topped goldenrod, pondshore rush, rose coreopsis, and golden pert; with beak sedge, lance-leaf violet, and dwarf St. John's-wort. Semi-permanently flooded zone characterized by one or more of the following: bayonet rush, spike sedge, and pipewort. Hydromorphic rooted vegetation in deep water including: yellow water-lily, white water-lily, and Robbin's spike-sedge.</p>
Leaf litter	

RIVERSIDES/STREAMSIDES COMMUNITIES



Shortcut Key: Check full descriptions following use



- | | |
|--|---|
| 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 – 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 |



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 herbaceous, open community with high species diversity. Occur on rocky or muddy edges of rivers scoured by flood and ice, and with groundwater discharge. Wettest spots typically mossy with a mixture of herbs and sedges.
Topography	Along base of steep riverbanks where groundwater seeps from the bottom of the upland slope.
Soils/Substrate	Variable, may be rocky edges of rivers or muddy banks.
Canopy	Canopy from surrounding community.
Sub-canopy	
Shrub layer	
Herb layer	Characteristic herbs include Joe-Pye-weed, boneset, orange jewelweed, and fringed loosestrife. Yellow monkey flower, Canadian burnet, and golden alexanders are good indicators of community. Non-native plants colt's foot and purple loosestrife may be abundant. Graminoids include wool grass, marsh and soft rush, green-fruited bur-reed, and sallow, seep, and northern awned sedge.
Leaf litter	

Mud Flat

S4

Description/Concept	Sparsely vegetated herbaceous community dominated by low, usually annual herbs. Occur on muddy streambanks or in shallow water of river backwaters and old oxbow ponds. Inundation by spring floods does occur.
Topography	Along streams, in backwaters, abandoned channels, lagoons, and oxbow ponds.
Soils/Substrate	Poorly drained mucky, silty mineral soils.
Canopy	(overhanging) Includes silver maple and American elm.
Sub-canopy	
Shrub layer	
Herb layer	Sparsely vegetated, typically with high species richness. Monkey flowers (winged and long-stalked) are good indicator species. Following species often dominant: large and lesser water-plantains, arrowheads, arrow-arum, and bur-reeds. Associated species include: sensitive fern, false nettle, clearweed, water-hemlock, sweet flag, wild calla, water parsnip, ditch stonecrop, water-purslane, awned sedge, river horsetail, smartweeds, and duckweeds.
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.
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, sand bar willow, and sand bar cherry form vegetative zone on sandiest sections.
Herb layer	On cobble, false dragonhead, cocklebur, beggar's ticks, and lady's thumb are dominant. 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. 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	
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 (may be dominant), cock-spur grass, fall panic grass, rice cut-grass, Canada bluejoint, St. John's-wort, smartweeds, and various goldenrods.
Herb layer	
Leaf litter	

Riverine Point Bar and Beach**S3**

Description/Concept	Sparsely vegetated exposed sandy beaches of major rivers. A poorly defined community similar to High-Energy Riverbank, but on sand rather than cobble. Much of community may be bare sand with only scattered plants.
Topography	High-gradient rivers.
Soils/Substrate	Sand.
Canopy	
Sub-canopy	
Shrub layer	Sand bar willow may occur at higher margins.
Herb layer	On sand, tall beggar's tick. Higher margins typically have smartweeds, cocklebur, and graminoids such as soft-stemmed spike-sedge, Smith's club-sedge, awned flatsedge, pondshore-flatsedge, and lovegrass.
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 or gray birch saplings.
Shrub layer	Typically have mixture of: speckled alder, smooth alder, highbush blueberry, meadowsweet, buttonbush, winterberry, sweet gale, swamp azalea, silky dogwood, northern arrow-wood, maleberry and non-native European alder buckthorn. Richer, circumneutral shrub swamps may be dominated by spicebush. Some shrub swamps are dominated by a single species, such as: black willow riverside thickets, highbush blueberry thickets, or buttonbush swamps.
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, sedges, and sphagnum.
Leaf litter	

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

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

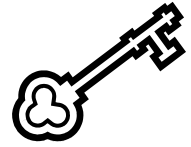
NOTE: Cranberry bogs do not fall under the natural community classification system, as they are human created and maintained wetlands. However, because cranberry plants are woody, the shrub swamp is the closest category for cranberry bogs.

[Decision Rules: Cranberry bogs are placed in the CB category.]

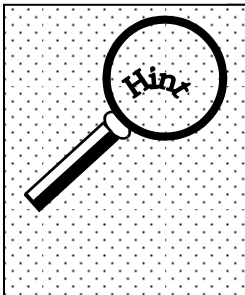
CALCAREOUS PEATLANDS COMMUNITIES (Mineral rich water with an accumulation of organic matter)



Shortcut Key: Check full descriptions following use



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 dominated peatlands, with a sparse shrub layer, occurring in a well-defined basin. Inputs of calcareous groundwater and, sometimes, surface water. Permanently saturated conditions.
Topography	In a well defined basin.
Soils/Substrate	Deep organic sediments.
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, and shrubby cinquefoil. 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

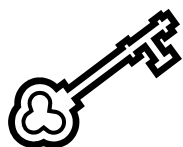
Description/Concept	Open, sedge dominated wetland with calcareous groundwater seepage. Considered rare species “hot spots.” Groundwater seepage may be visible as distinct rivulets.
Topography	Slight to moderate slopes.
Soils/Substrate	Exposed mineral soils exposed in areas of heavy groundwater discharge. Small hummocks of organic material may be present.
Canopy	Sparse cover. Common trees include white pine and tamarack.
Sub-canopy	
Shrub layer	Sparse cover. Common shrubs include shrubby cinquefoil, autumn-willow, and alder-leaf buckthorn. Disturbed areas have reduced shrubby growth.
Herb layer	Dominated by sedges , such as inland prickly sedge, delicate sedge, yellow sedge, and porcupine sedge. Typical associates include grass-of-Parnassus, rough-leaved goldenrod, and marsh fern.
Leaf litter	

Calcareous Seepage Marsh

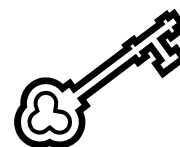
S2

Description/Concept	Open community of emergent grasses and herbs, with scattered shrubs with some calcareous groundwater seepage. Occurs in a variety of physical settings, including basins, canopy gaps in forested swamps, current and former beaver drainages, and in association with Calcareous Sloping Fens.
Topography	Level to slightly sloping sites.
Soils/Substrate	Typically 50 – 200+ cm (20 – 79+ inches) of moderate to well-decomposed organic sediments.
Canopy	
Sub-canopy	
Shrub layer	Scattered shrubs, such as swamp-birch, hoary willow, meadowsweet, and poison sumac.
Herb layer	A mixture of typical marsh species and calcium loving species. Typical marsh species include marsh sedge, tussock sedge, marsh fern, phragmites, cat-tails, purple loosestrife, Labrador bedstraw, and swamp loosestrife. Calcium-loving species include swamp-birch, hoary willow, shrubby cinquefoil, and fen bedstraw.
Leaf litter	

ACIDIC PEATLANDS COMMUNITIES (Acidic Conditions, with Sphagnum)



Shortcut Key: Check full descriptions following use



- | | |
|--|--|
| 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 – Acidic Graminoid Fen |
| 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 <i>not</i> located in a kettlehole. | A. Yes – Level Bog |



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
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
Shrub Dominated <div style="text-align: right; padding-right: 20px;">Low Growing/Dwarf Shrubs</div> <div style="text-align: right; padding-right: 20px;">Tall Shrubs</div>	Acidic Shrub Fen
	Level Bog
	Kettlehole Level Bog
	Highbush Blueberry Thicket

Descriptions of Acidic Peatlands Communities

Sea Level Fen (*Probable community type in Massachusetts*)

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.
Topography	Interface between estuarine marshes and upland seepage slopes.
Soils/Substrate	
Canopy	
Sub-canopy	
Shrub layer	
Herb layer	Probable occurrences from Martha's Vineyard have saltmarsh spike-sedge co-occurring with acidic fen species. Diagnostic species from elsewhere in northeast include: saltmarsh straw-sedge, saltmarsh spike-sedge, and saltmarsh-threesquare. Other common species from the northeast include New York aster, twig sedge, spatulate-leaved sundew, Canada rush, pondshore-rush, swamp-candles, common reed, white beak-sedge, swamp rose, common threesquare, poison ivy, 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 basin, typically with inlets and outlets.
Soils/Substrate	
Canopy	Patchy tree and shrub cover. Red maple and Atlantic white cedar may occur.
Sub-canopy	
Shrub layer	Occur in clumps, but are not dominant throughout. Lacks extensive leatherleaf and water-willow. Cranberry may be abundant. Patchy tree and shrub cover. Shrubs include: sweet pepper-bush, swamp azalea, poison sumac, and bayberry.
Herb layer	Graminoid species abundant. Beaked sedge and slender wooly-fruited sedge often dominant. Good indicator species include: white beak-sedge, twig sedge, and pondshore rush. Characteristic herbaceous species include arrow-arum and rose pogonia.
Leaf litter	

Acidic Shrub Fen**S3**

Description/Concept	Shrub dominated acidic peatland characterized by a mixture of 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. Similar in structure to dwarf ericaceous shrub bogs, but they are wetter with a less well-developed sphagnum mat.
Topography	Typically found along wet pond margins.
Soils/Substrate	
Canopy	Scattered red maple and Atlantic white cedar may occur.
Sub-canopy	
Shrub layer	Evergreen and deciduous shrubs occur. Typical species include: leatherleaf, water-willow, sweet gale, meadowsweet, sweet pepper-bush, and alder.
Herb layer	Limited number of herbaceous species, including St. John's-wort and arrow-weed.
Leaf litter	

Highbush Blueberry Thicket**S4**

Description/Concept	Tall acidic peatlands dominated by dense highbush blueberry bushes on hummocky sphagnum moss. Generally flooded in spring and early summer, but water below surface level by late summer or early spring. Sphagnum mat variable.
Topography	Many known examples of this community occur in kettleholes.
Soils/Substrate	
Canopy	
Sub-canopy	
Shrub layer	Dominated by highbush blueberry. Rhododendron is a common associate. Short shrubs include sheep laurel, leatherleaf, and huckleberry.
Herb layer	Sphagnum may be continuous and stable, or occur in patches below shrubs.
Leaf litter	

Level Bog**S3**

Description/Concept	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 isolated valley bottoms.
Soils/Substrate	
Canopy	Scattered, stunted coniferous, primarily tamarack and black spruce, occur throughout.
Sub-canopy	
Shrub layer	Leatherleaf is dominant. Other typical ericaceous shrubs include: rhodora, sheep laurel, bog laurel, bog rosemary, Labrador tea, and low-growing large and small cranberry.
Herb layer	A mixture of specialized bog plants grows on the hummocky sphagnum surface, including pitcher plants and sundews.
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.
Topography	Kettle depression.
Soils/Substrate	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	A mixture of specialized bog plants grows on the hummocky sphagnum surface, including pitcher plants and sundews.
Leaf litter	

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

Plants Associated with Acidic Peatlands Communities

	Sea Level Fen	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 Woolly-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.)

VERNAL POOL COMMUNITY

Description of Vernal Pool Community

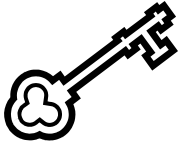
Woodland Vernal Pool

S3

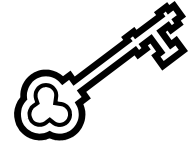
Description/Concept	Small, shallow depressions within upland forests that are temporarily flooded. Often have little or no vegetation.
Topography	Shallow depressions isolated from surface waters.
Soils/Substrate	Hydric soils (typically.)
Canopy	Same as adjacent community.
Sub-canopy	
Shrub layer	Ringed by upland shrubs.
Herb layer	
Leaf litter	Layer of water stained leaves in dry depression is characteristic.

NOTE: Because there is only one vernal pool community type there is no key provided.

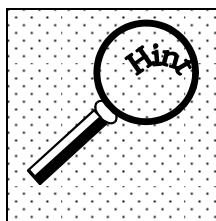
CONIFER DOMINATED COMMUNITIES



Shortcut Key: Check full descriptions following use



1. Hemlock dominant or co-dominant. A. Yes – Hemlock – Hardwood Swamp
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 and balsam fir dominant in overstory. A. Yes – Spruce – Fir Boreal 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



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 – Hardwood Swamp

S4

Description/Concept	Forested swamp with hemlock dominant or co-dominant in the canopy. Hemlock may form dense stands, or may be associated with other species. Ground layer hummocky and moss covered.
Topography	Poorly drained basins in bedrock and till.
Soils/Substrate	Muck, saturated throughout the year.
Canopy	Hemlock is the dominant and characteristic species. May be in association with white pine, red maple, and yellow birch.
Sub-canopy	
Shrub layer	Sparse due to limited light passing through canopy. Shrubs may form dense thickets beneath canopy gaps. Typical shrubs include: alders, highbush blueberry, winterberry, and mountain-holly.
Herb layer	<i>HEMLOCK DOMINANT (>75% HEMLOCK):</i> Hummocky and moss covered. Ferns common, including cinnamon and sensitive. Goldthread common. <i>HEMLOCK MIXED WITH HARDWOODS (50% HEMLOCK):</i> Species diversity higher than in pure/near pure hemlock dominant community. Wood-ferns (spinulose, intermediate, and crested) may be abundant.
Leaf litter	

[Decision Rule: MassWildlife subdivides this community on the basis of % hemlock (50-75% vs. >75%). HeH sw category = >50% hemlock; He/H sw category = >75% hemlock.]

Spruce – Tamarack Bog

S2

Description/Concept	Acidic forested peatlands with an overstory of black spruce and tamarack, and an understory of heath shrubs on sphagnum moss. Forested bogs are late successional peatlands that occur on thick peat deposits. Trees draped with lichen (<i>Usnea</i> spp.) Moat around forested bog.
Topography	Kettlehole depressions, watershed divides, and along pond margins.
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.
Sub-canopy	
Shrub layer	Labrador tea and bog laurel are good indicators , but don't always occur. Mountain-holly, wild raisin, and sheep laurel commonly occur.
Herb layer	<i>Sphagnum</i> spp., three-seeded bog sedge, three-leaved Solomon's seal, bluebead lily, goldthread, and creeping snowberry.
Leaf litter	

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

Spruce – Fir Boreal Swamp

S3

Description/Concept	Forested wetland dominated by red spruce and balsam fir. Occur in western and north-central Massachusetts.
Topography	Poorly drained basins or stream headwaters at high elevation (1,500 – 2,000 feet.)
Soils/Substrate	Typically on poorly drained glacial till. Peat accumulation is minimal.
Canopy	Red spruce and balsam fir are dominant in the canopy. White pine, black cherry, tamarack, black spruce, paper birch, hemlock, yellow birch, and red maple may also occur in the canopy.
Sub-canopy	
Shrub layer	Mountain-holly, wild raisin, and sheep laurel almost always occur. American mountain-ash, hobble-bush, and mountain maple may also occur.
Herb layer	Typical species are northern awned sedge, New England sedge, goldthread, creeping Snowberry, bluebead lily, one-sided pyrola, bishop’s cap, lesser mitrewort, mountain wood-sorrel, royal fern, and pale St. John’s-wort.
Leaf litter	Carpet of moss.

[Decision Rules: SF sw category = >75% red spruce, black spruce, or balsam fir, singly or combined.]

Atlantic White Cedar Bog

S2

Description/Concept	Acidic forested peatland with a nearly continuous shrub layer and an open canopy in which AWC is the characteristic tree species. Semi-forested level bogs with sphagnum mats .
Topography	Semi-forested level bogs with sphagnum mats.
Soils/Substrate	
Canopy	Total canopy coverage is low. 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	Nearly continuous. Low shrub layer mixed with clumps of tall shrubs. Low shrubs dominated by leatherleaf. Tall shrubs include highbush blueberry and swamp azalea. Other associated shrubs are: black huckleberry, dwarf huckleberry, and large and small cranberry.
Herb layer	Typically well-formed sphagnum moss layer beneath shrubs, with sundews and pitcher plants occurring throughout.
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. Standing water present for >50% of growing season.
Topography	Occur within the floodplain of rivers or streams, or at the fringes of open marshy areas along ponds.
Soils/Substrate	Water-saturated peat overlies mineral sediments.
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

S2

Description/Concept	A variant of the Spruce – Fir Boreal Swamp community, in which Atlantic white cedar is an associate in the canopy. Standing water generally occurs for half of growing season.
Topography	Occur within high-elevation basins.
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	Northern conifers , such as black spruce, red spruce, and balsam fir dominate the canopy . Atlantic white cedar occurs as an associate.
Sub-canopy	
Shrub layer	Shrubs similar to those found in high-elevation Inland Atlantic White Cedar Swamps; especially mountain holly, creeping snowberry, and bunchberry. Labrador tea and rhodora are also 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 (<40 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. Coastal “indicator” species: inkberry, dangleberry, and bayberry. Highbush blueberry, swamp azalea, sweet pepper-bush, and fetterbush common associates. Highbush blueberry and fetterbush thicker and more abundant in coastal community than inland community. Inkberry common in this community on Cape Cod.
Herb layer	Sparse and patchy. Cinnamon fern, Virginia chain-fern (a coastal indicator), 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.
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, mixed with red maple, hemlock, and yellow birch (the last two species, in number, are indicative of inland communities.)
Sub-canopy	
Shrub layer	Less dense than coastal Atlantic White Cedar Swamp. Sweet pepper-bush and winterberry occur. Highbush blueberry and fetterbush may occur, but are less thick and abundant than in coastal swamps.
Herb layer	Sparse and patchy. Cinnamon fern, starflower, and Canada Mayflower.
Leaf litter	Acidic conditions make leaf litter decomposition slow.

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

Plants Associated with Conifer Dominated Communities

	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
Alder	Occurs							
Azalea, Swamp				Occurs			Common	
Bayberry							Occurs	
Birch, Grey				Occurs				
Birch, Paper			Occurs					
Birch, Yellow	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			
Fern, Cinnamon	Occurs						Occurs	Occurs
Fern, Marsh					Occurs			
Fern, Royal			Typical		Occurs			
Fern, Sensitive	Occurs				Occurs			
Fetterbush							Common	Occurs
Fir, Balsam			Dom.			Dom.		
Goldthread	Occurs	Occurs	Typical					
Hemlock, Eastern	Dom./Char.		Occurs				Infreq.	Occurs
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
Mayflower, Canada								Occurs
Mitrewort, Lesser			Typical					
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
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.		
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					

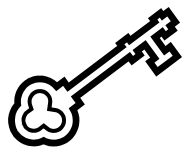
Char. = Characteristic

Co-dom = Co-dominant

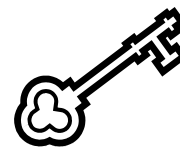
Dom. = Dominant

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



Shortcut Key: Check full descriptions following use



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 – Black Ash – Red Maple – Tamarack Calcareous Seep
B. No – Black Ash Swamp
8. Red maple co-dominant with black gum (i.e., tupelo.)
A. Yes – Go to 9
9. Black gum, pin oak, and swamp white oak co-dominant.
A. Yes – Black Gum – Pin Oak – Swamp White Oak “Perched” Swamp
B. No – 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

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.

	<p>The easiest approach to identifying these communities is to determine if silver maple is present, and if it is dominant or co-dominant.</p> <p>The amount of red maple, silver maple, and black ash will help you identify the correct community.</p>
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Descriptions of Hardwood Dominated Communities

Cobble Bar Forest

S2

Description/Concept	A variant of high-energy riverbanks characterized by open forests dominated by stunted sycamores and cottonwoods growing on sandy cobble bars. Known distribution restricted to Connecticut River Valley and the Berkshires.
Topography	Along high-energy rivers subjected to flooding and ice scour.
Soils/Substrate	Cobble substrates deposited by high-energy rivers.
Canopy	Sycamore dominant , with cottonwood and silver maple.
Sub-canopy	American elm occurs.
Shrub layer	Exotic species including multiflora rose, honeysuckles, Oriental bittersweet, and Japanese knotweed are common in many examples of this community.
Herb layer	Herbs occur in sand/silt among cobbles. Typical species include sensitive fern, false Solomon's seal, and horsetails. Poison ivy and Virginia creeper can be abundant.
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.
Topography	Hillside seeps and upland drainages. Seasonally flooded basins.
Soils/Substrate	Shallow to thick organic layers overlying mineral sands/silts.
Canopy	Red maple dominant. 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; 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 are the dominant shrubs in eastern Massachusetts. Other common shrubs include: highbush blueberry and winterberry (often dominant); 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. Graminoids common and mixed with a variety of herbaceous species. Common herbaceous species include: skunk cabbage, false hellebore, spotted touch-me-not, swamp dewberry, marsh marigold, and the bugleweeds.
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.
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. Red and silver maple, with sugar maple, shagbark hickory, black cherry, American elm, and basswood.
Sub-canopy	Typically, open sub-canopy of ironwood; this is a good indicator for this community.
Shrub layer	Variable, from sparse to well-developed. Arrow-wood, nannyberry, and winter most common native species; often mixed with barberry and buckthorns.
Herb layer	Mixture of characteristic floodplain forest ferns and rich upland herbs. Ostrich fern, Canada mayflower, 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. 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 over bank flooding.
Topography	Low areas along 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. Lesser amounts of green ash and/or swamp white oak. Red oak, white pine, and black cherry occur in elevated sections.
Sub-canopy	
Shrub layer	Well-developed shrub layer. Northern arrow-wood, European buckthorn, and silky dogwood.
Herb layer	Herb layer often dominated by sensitive fern, and false nettle. With a rich assemblage of herbaceous species. Common associates include royal fern, awned sedge, and bugleweeds.
Leaf litter	

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

Black Ash – Red Maple – Tamarack Calcareous Seep**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	
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.), bur oak, 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 Ash Swamp****S2**

Description/Concept	A red maple swamp with black ash co-dominant. Occur in circumneutral groundwater.
Topography	Occur in river floodplains, as “small seepy” pockets in red maple swamp, or at stream headwaters. Microtopography is hummock-hollow , with sphagnum moss on hummocks.
Soils/Substrate	
Canopy	Black ash co-dominant with red maple. Sugar maple, eastern hemlock, yellow birch, and white pine may also occur.
Sub-canopy	Ironwood common but not always present.
Shrub layer	Common shrubs include: spicebush, winterberry, highbush blueberry, mountain holly, and northern arrow-wood. Occasional witch hazel.
Herb layer	Skunk cabbage and cinnamon fern common. Other ferns (sensitive, royal, and lady), Jack-in-the-pulpit, tussock-sedge, swamp saxifrage, and jewelweed common associates.
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

S2

Description/Concept	A red-maple dominated swamp in which black gum, pin oak, and swamp white oak are important components of the overstory. 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	Red maple dominant with southern tree species (black gum, pin oak, and swamp white oak) co-dominant. Eastern hemlock is a common associate.
Sub-canopy	
Shrub layer	Similar to other forested swamps. Common species include highbush blueberry, northern arrow-wood, common winterberry, and serviceberry.
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.)]

Black Gum Swamp

S2

Description/Concept	Forested basin swamp with an accumulation of peat, where black gum is the dominant canopy tree. Seepage may occur at edge of basins. Highly acidic, pH ranges from 3-5.
Topography	Poorly-drained peatlands. Microtopography is pronounced hummock-hollow , with woody vegetation confined to hummocks.
Soils/Substrate	Accumulations of peat.
Canopy	Open, often in 25-50% closure range. Black gum dominant, with abundant red maple and eastern hemlock. Yellow birch, white pine, and black ash may also be common.
Sub-canopy	
Shrub layer	Well-developed; typically with common and smooth winterberry, mountain laurel, common mountain-holly, highbush blueberry, and wild raisin.
Herb layer	Herbaceous species occur on hummocks, and include cinnamon fern, beggar-ticks, goldthread, northern water-horehound, swamp dewberry, marsh St. John’s-wort, and Massachusetts fern. Wet hollows are typically lined with sedges, including silvery bog-sedge, bladder-sedge, tussock sedge, and three-seeded bog-sedge.
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. 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 <u>without</u> a surface organic layer.
Canopy	Silver maple is strongly dominant , usually >60% cover, mixed with lesser amounts of cottonwood. <i>ISLAND VARIANT:</i> 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. <i>ISLAND VARIANT:</i> Boxelder and hackberry occur.
Shrub layer	<i>ISLAND VARIANT:</i> 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. Whitegrass is consistently represented in low amounts, typically <5% cover. Common associates include woodreed and Jack-in-the-pulpit. <i>ISLAND VARIANT:</i> has herb layer strongly dominated by ostrich fern, with river-bank 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 where the banks are low and over bank flooding occurs.
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. Cottonwood and red maple are both typically absent. Pin oak common along Connecticut River basin, and river birch common in the Merrimack River basin.
Sub-canopy	
Shrub layer	Shrub layer less than in alluvial forest community. Shrub layer mainly consists of silky dogwood and buttonbush.
Herb layer	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	<p>This community is intermediate in composition and soils between major- and small-river floodplain forests.</p> <p>A silver maple - green ash – American elm forest occurring on alluvial soils.</p> <p>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.</p> <p>Generally experience annual flooding.</p>
Topography	Floodplains and depressions.
Soils/Substrate	<p>Silt loams or very fine sandy loams with soil mottling present within 2 ft. of surface.</p> <p>Surface organic layer is typically absent.</p>
Canopy	<p>Silver maple is dominant.</p> <p>Cottonwood is typically absent.</p> <p>Green ash and American elm are present.</p>
Sub-canopy	
Shrub layer	<p>Generally lacking, but saplings of canopy trees are common.</p> <p>Vines are abundant, with hog peanut most common.</p> <p>Wood-nettle present in low amounts, about 5-15% cover.</p>
Herb layer	Typically an even mixture of wood-nettle, false nettle, and ostrich and sensitive ferns.
Leaf litter	

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

Plants Associated with Hardwood Dominated Communities
Part 1. Communities always associated with rivers and floodplains

	Cobble Bar Forest	High-Terrace Floodplain Forest	Alluvial Red Maple Swamp	Major River Floodplain Forest	Major River Floodplain Forest (Island Variant)	Transitional Floodplain Forest	Small-River Floodplain Forest
Arrow-wood, Northern		Occurs	Occurs				
Ash, American					Occurs		
Ash, Green			Occurs			Occurs	
Avens, Floodplain		Char.					
Barberry, Japanese		Occurs					
Basswood		Occurs					
Bellwort		Occurs					
Birch, River							Common
Bittersweet, Oriental	Occurs				Occurs		
Boxelder					Occurs		
Buckthorn		Occurs					
Buckthorn, European			Occurs				
Bugleweeds			Common				
Buttonbush							Common
Cherry, Black		Occurs	Occurs				
Cottonwood	Common			Occurs	Occurs	Absent	Absent
Dogwood, Silky			Occurs				Common
Elm, American	Occurs	Occurs		Occurs		Occurs	
Elm, Slippery				Occurs			
Fern, Lady		Occurs					
Fern, Ostrich		Occurs		Occurs	Dominant	Occurs	
Fern, Royal			Common				
Fern, Sensitive	Typical		Dominant			Occurs	Common
Goldenrod, Zigzag		Occurs					
Grape, River-bank					Common		
Grass, Bottlebrush		Char.					
Grass, White				Occurs			
Hackberry					Occurs		
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 always associated with rivers and floodplains
(continued)

	Cobble Bar Forest	High-Terrace Floodplain Forest	Alluvial Red Maple Swamp	Major River Floodplain Forest	Major River Floodplain Forest (Island Variant)	Transitional Floodplain Forest	Small-River Floodplain Forest
Maple, Red		Occurs	Co-dom.				Absent
Maple, Silver	Common	Occurs	Co-dom.	Dominant	Occurs	Dominant	Dominant
Maple, Sugar		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				
Poison Ivy	Occurs	Occurs					
Rose, Multi-flora	Occurs						
Sedge, Awned			Common				
Snakeroot, White		Occurs					
Solomon's Seal, False	Typical						
Sumac, Staghorn					Occurs		
Swamp-Candles							Occurs
Sycamore	Dominant				Occurs		
Trillium		Char.					
Trout-lily		Char.					
Virginia Creeper	Occurs	Occurs			Common		
Water Hemlock							Occurs
Water Parsnip							Occurs
Wild Rye, Weigand's		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	Black Ash Swamp	Black Gum – Pin Oak – Swamp White Oak “Perched” Swamp	Black Gum Swamp
Alder, Speckled	Occurs	Occurs			
Arrow-wood, Northern	Occurs		Common	Common	
Ash, Black		Common	Co-dominant		Common
Ash, White	Occurs				
Azalea, Swamp	Dominant				
Beggar-ticks					Occurs
Birch, Yellow	Occurs	Occurs	Occurs		Common
Blueberry, Highbush	Occurs	Occurs	Common	Common	Occurs
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
Fern, Lady			Occurs		
Fern, Marsh	Occurs				
Fern, Massachusetts					Occurs
Fern, Royal	Occurs	Typical	Occurs		
Fern, Sensitive	Occurs	Typical	Occurs		
Fir, Balsam		Occurs			
Goldenrod, Rough-leaved		Occurs			
Goldthread				Common	Occurs
Gum, Black	Occurs			Co-dominant	Dominant
Hellebore, False	Common				
Hemlock, Eastern	Occurs	Occurs	Occurs	Common	Abundant
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
Maple, Sugar			Occurs		
Marigold, Marsh	Common				
Mayflower, Canada				Common	

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

	Red Maple Swamp	Black Ash – Red Maple – Tamarack Calcareous Seep	Black Ash Swamp	Black Gum – Pin Oak – Swamp White Oak “Perched” Swamp	Black Gum Swamp
Meadowsweet		Occurs			
Mitrewort, Naked		Occurs			
Mountain-holly, Common			Occurs		Occurs
Nannyberry	Occurs				
Oak, Bur		Occurs			
Oak, Pin	Occurs			Co-dominant	
Oak, Swamp White	Occurs			Co-dominant	
Pepper-bush, Sweet	Dominant				
Pine, White	Occurs	Occurs	Occurs		Common
Ragwort, Golden		Occurs			
Saxifrage, Swamp			Occurs		
Sedge				Common	
Sedge, Bladder-					Occurs
Sedge, Brome-like		Occurs			
Sedge, Delicate		Occurs			
Sedge, Long-stalked		Occurs			
Sedge, Tussock-			Occurs		Occurs
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			
Touch-me-not, Spotted	Common				
Water-Horehound, Northern					Occurs
Wild Raisin					Occurs
Winterberry, Common	Occurs	Occurs	Common	Common	Occurs
Winterberry, Smooth					Occurs
Witch Hazel			Occurs		
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	Coastal Interdunal Marsh Swale
			Deep Emergent Marsh
			Shallow Emergent Marsh
	Pondshores/Lakeshores	N/A	Wet Meadow
			Kettlehole Wet Meadow
			Inland Acidic Pondshore/Lakeshore
	Riversides/Streamsides	N/A	Coastal Plain Pondshore
			Calcareous Pondshore/Lakeshore
Mud Flat			
Shrub Swamps	N/A	Low-Energy Riverbank	
		Riverside Seep	
		High-Energy Riverbank	
Peatlands (Bogs & Fens)	N/A	Riverine Pointbar and Beach	
		Shrub Swamp	
		Calcareous Sloping Fen	
Vernal Pools	N/A	Calcareous Seepage Marsh	
		Calcareous Basin Fen	
		Acidic Graminoid Fen	
			Acidic Shrub Fen
			Sea-Level Fen
			Level Bog
			Kettlehole Level Bog
			Highbush Blueberry Thicket
			Woodland Vernal Pool

Hierarchical classification of natural communities within the Palustrine System

Sub-System	Community Group	Community Sub-group	Community Type
Forested	Conifer Dominated	N/A	<ul style="list-style-type: none"> Hemlock-Hardwood Swamp Coastal Atlantic White Cedar Swamp Inland Atlantic White Cedar Swamp Alluvial Atlantic White Cedar Swamp Atlantic White Cedar Bog Spruce – Tamarack Bog Spruce – Fir Boreal Swamp Northern Atlantic White Cedar Swamp
	Hardwood Dominated	N/A	<ul style="list-style-type: none"> Red Maple Swamp Alluvial Red Maple Swamp Small-River Floodplain Forest Black Ash Swamp High-Terrace Floodplain Forest Black Ash – Red maple – Tamarack Calcareous Seepage Black Gum – Pin Oak – Swamp White Oak “Perched” Swamp Black Gum Swamp Major-River Floodplain Forest Transitional Floodplain Forest Cobble Bar Forest

