

HABITATS OF THE



**Including Lake Erie,
its Southern Lake Plain &
the Glaciated Allegheny Plateau**



Prepared by:

Dylan S. Stover and Robert L. Curtis



Natural Resource Management Department
975 Treaty Line Road, Akron, Ohio
www.summitmetroparks.org
330-865-8057

MAY 2014 (revised August 2015)

LEAP REGION

Lake Erie Allegheny Partnership (LEAP) for Biodiversity was formed near the turn of the century to unite conservation efforts in and around Cleveland, Ohio, from approximately Columbus and Sandusky to Buffalo, New York. Based on an ecoregion concept, LEAP's focal area is on the non-calcareous drift of the glaciated Western Allegheny Plateau, often referred to as the Glaciated Allegheny Plateau or simply Allegheny Plateau. The U.S. Environmental Protection Agency classifies this area, including the Erie lake plain, as Erie/Ontario Drift and Lake Plain (Level III Ecoregion 61). The LEAP region utilizes this concept and includes the adjacent southern portion of Lake Erie to the Canadian border.

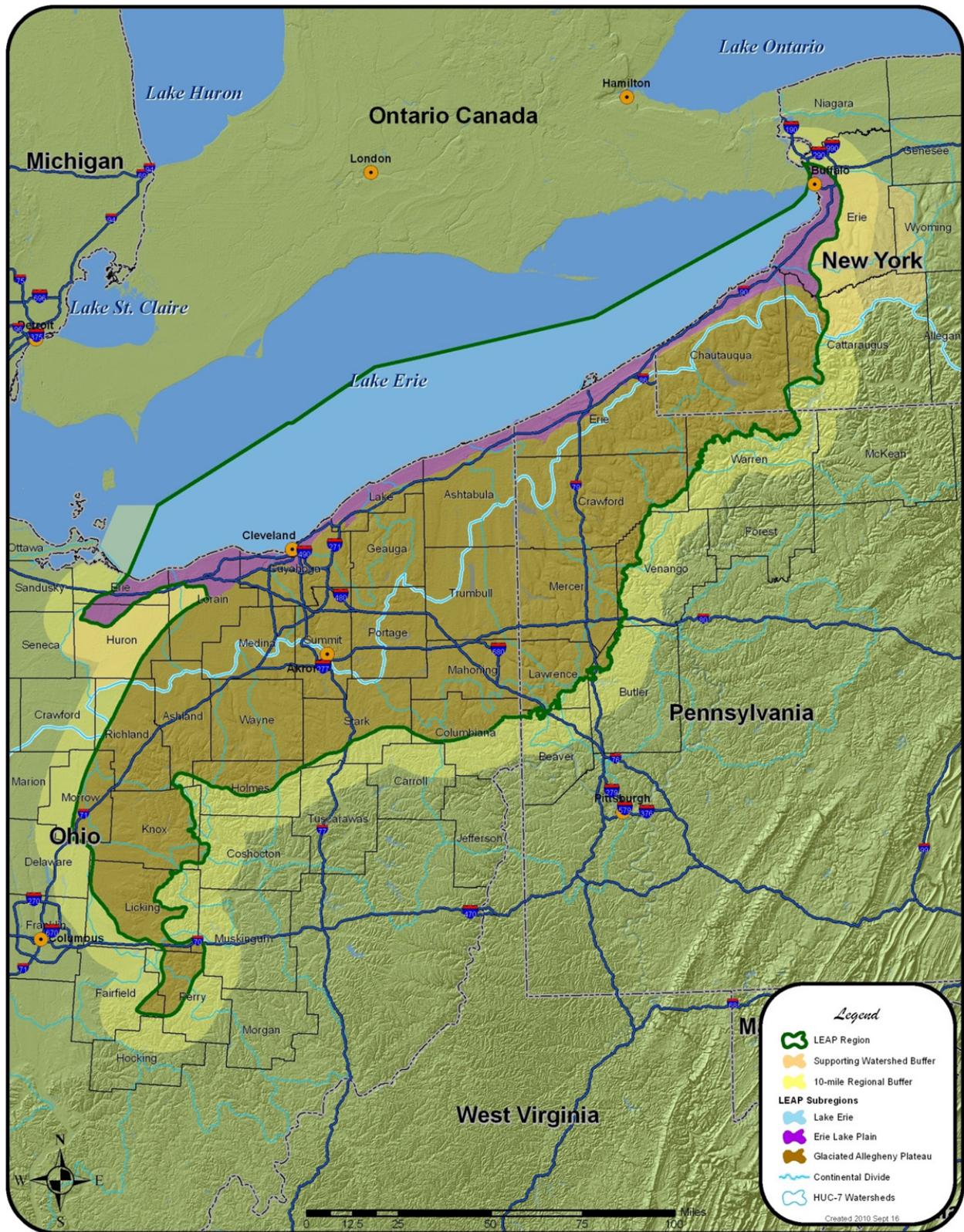
Our 1700 square mile region lies between 40° and 43° Latitude and has an elevation ranging from 600-1500 ft above sea level. It is characterized by a temperate climate with weather systems typically approaching from the southwest or northwest, across Lake Erie. Lake Erie is the southernmost and shallowest of the great lakes, reaching just over 200 ft in depth, and often completely freezes over in the winter. The lake heavily influences precipitation and temperatures of the region, especially along its southern plain, where there is more precipitation, heavier snowfall and a much longer growing season. The average annual temperature for the region is about 49°F, with a typical year having several days below 0°F and about a week over 90°F. The growing season averages from 130 days in northern inland areas, to just under 200 days near the lake. Average annual precipitation is about 40 inches, but includes 2-9 ft of snow, depending on proximity to Lake Erie. Soils are built on a foundation of rolling, largely sandstone-based, glacial and lacustrine deposits, which provide a relatively loose, infertile, acidic surface.

Historically, our inland terrestrial landscape was primarily deciduous and mixed forest, with the exception of some extensive wetland systems and small slumps, dunes and outcrops. However, a century ago nearly the entire area was cleared and drained for agriculture and industrialization, and larger wildlife species were eliminated. In the last fifty years, much of our farmland has been converted into sprawling urban complexes connected by an impressive transportation grid. A sparse matrix of leftover wetlands, forest fragments and various stages of fallow agriculture, partially connected by riparian corridors, are all that remains of our once unbroken natural expanses. Furthermore, these systems are very unlikely to regenerate back into what they once were, due to 1) the nature of past human disturbance, 2) present manmade conditions, 3) exotic species introductions, and 4) potential climatic changes. Although we do have relict historic habitats, novel systems often spearhead any natural recovery processes.

DOCUMENT USE

This document attempts to classify and describe all cultural, aquatic, and terrestrial habitats within the LEAP region. These first iterations are intended to spur interest and be used as a template to further develop a comprehensive regional classification scheme. Habitats are defined herein as areas ≥ 0.1 acre, having similar structure and species composition; microhabitat niches, though they may be important components of these communities, are only briefly treated. A hierarchy has been chosen which follows and includes most other commonly used classification systems. The approach begins with primary cover types, is succeeded by ground drivers such as geology and moisture, and finishes with plant groupings and associations.

The key is designed to be used with basic vascular plant and ground surface field data, similar to that collected for a typical wetland determination¹. At a minimum, aerial cover estimates (including unvegetated area) over a 30+ft radius, for groundcover, shrub and tree strata, must be collected. Ground surface data, including percent cover of each type, soil conditions and water depth, are necessary for some habitat groups. Wetland concepts, such as hydrophytic vegetation², wetland hydrology, and hydric soils³ are also important. The key is generally ordered from more to less disturbed, more to less open, and more to less dry; however, it is not flawlessly followed. Habitat names, codes, descriptions and synonymy for New York⁴ (NY), Ohio⁵ (OH), Pennsylvania⁶ (PA) and NatureServe⁷ (NS; including global status) are provided with each section. Synonymy uses standard mathematical symbols for equals (=), approximately equals (\approx), broader than (>) and finer than (<).



LEAP Region.

GLOSSARY

- Aquatic Bed** – plant communities dominated by species primarily growing on or under the water surface
- Dimictic (Lake)** – a lentic water body having two annual turnovers, typically in the spring and fall
- Emergent Plant** – refers to vascular plants that emerge from water or waterlogged soils during normal growth; herein excludes deepwater species such as spatterdock (*Nuphar* spp.) and American lotus (*Nelumbo lutea*)
- Epilimnion** – the warm, well-lit surfacewater zone of a lentic waterbody, typically having high biologic activity and higher pH than the cold deeper waters; temporarily lost during the seasonal turnovers of some systems
- Exposed** – not directly overshadowed by vegetation in a higher stratum; open to sky
- Floating-leaved Plant** – aquatic vascular plant having stems or leaves that float on the water surface; may be rooted in substrate (e.g., *Nymphaea* spp.) or free-floating (e.g., *Lemna* spp.); herein includes deepwater species such as spatterdock (*Nuphar* spp.) and American lotus (*Nelumbo lutea*)
- Floodplain (Active)** – a site adjacent to a stream channel that is flooded at least once per year; sediment deposits, debris piles, and/or evidence of erosion should be visible
- Forb** – nongrass herbaceous vascular plants
- Graminoid** – vascular plants belonging to the grass (Poaceae), sedge (Cyperaceae), or rush (Juncaceae) family
- Grass** – vascular plants in the Poaceae family
- Groundcover** - the vegetative stratum from ground level to 4.5 ft tall; occurring below the shrub stratum
- Herb** – a non-woody vascular plant dying down to the ground each winter
- Herbaceous Plant** – vascular plant lacking woody stems
- Hypolimnion** – the deep coldwater zone of a lentic waterbody, typically having anoxic conditions and a lower pH than warmer surface waters; temporarily lost during seasonal turnovers of some systems
- Hydric (Soil)** – formed under anaerobic conditions, frequently or permanently inundated or saturated
- Hydrophytic** – adapted to growing in wetland conditions; having a prevalence of wetland species (including those with FAC, FACW, or OBL wetland indicators)
- Lacustrine** – lake system; lentic waterbody >20 acres; includes large reservoirs
- Lake** – lentic waterbody >20 acres, typically having wave-action shorelines
- Lentic** – stillwater systems; nonflowing water bodies such as ponds, lakes and reservoirs
- Limnetic** – the lighted upper part of a lentic waterbody suitable for photosynthesis, typically 0-30 ft deep; sometimes also refers to the deepwater (i.e. pelagic) horizontal zone beyond the shoreward littoral zone
- Littoral** – shoreward horizontal portion of a lentic waterbody where light reaches the bottom/benthic zone; water typically <30 ft deep
- Lotic** – riverine, or flowing, water bodies such as streams and rivers
- Meromictic (Pond or Lake)** – a lentic water body with no turnovers; typical of a small deep pond
- Mesic** – (soil) of even moisture, neither xeric nor hydric; (vegetation) adapted for growth in soils of moderate or average moisture
- Mineral (Soil)** – derived from weathered bedrock and decayed organic materials; not formed under wetland conditions (cf. organic soil)
- Monomictic** – a lentic water body having one annual turnover, in the spring or fall
- Organic (Soil)** – primarily derived from decayed plant materials and commonly formed under anaerobic wetland conditions (cf. mineral soil)
- Palustrine** – vegetated nonflowing freshwater habitats such as wetlands, marshes and bogs; may include unvegetated pond shallows <6.6 ft deep
- Pelagic** – deepwater horizontal zone beyond the shoreward littoral zone; typically refers to areas of water >30 ft deep
- Pond** – lentic waterbody <20 acres, typically <30 ft deep and without a wave-action shoreline
- Profundal** – deep perennially dark waters of a lentic water body; typically >30 ft deep
- Riverine** – lotic, or flowing, waterways such as streams and rivers
- River** – lotic waterway with supporting watershed of >20 sq mi
- Seral** – successional state
- Shrub** – any woody plant within the horizontal *stratum* 4.5-20 ft above the ground or a self-supported woody species normally remaining <20 ft tall; this category includes species such as pussy willow (*Salix discolor*) and alder (*Alnus* spp.), which may occasionally exceed 20 ft in height but are commonly considered shrubs, as well as dwarf woody species that rarely exceed 4.5 ft, such as leatherleaf (*Chamaedaphne calyculata*), shrubby cinquefoil (*Dasiphora fruticosa*), swamp loosestrife (*Decodon verticillatus*), and many blueberries (*Vaccinium* spp.)
- Stream** – lotic waterway with supporting watershed of <20 sq mi
- Submerged(ent) Plant** – having leaf and stem tissues completely immersed in water during all of their growing cycle (reproductive organs held above water surface in some species)
- Tree** – any woody plant >20 ft tall or a self-supported woody species normally growing to >20 ft tall; included here are certain small trees, such as crabapple (*Malus coronaria*) and hawthorn (*Crataegus* spp.) which occasionally form thickets of dense growth <20 ft in height
- Vascular Plant** – a plant with vascular tissue, including all clubmosses, horsetails, ferns, conifers and flowering plants
- Woody Plant** – a vascular plant retaining perennial aboveground living tissue; not normally dying down to the ground each winter
- Xeric** – (soil) exceedingly well-drained and dry; (vegetation) adapted for growing in dry conditions

HABITATS

- a. Area natural, unmaintained **OR** actively maintained by humans in a seminatural state b
- a. Area actively maintained by humans in an unnatural state **I. CULTURAL HABITATS**

- b. Ground not permanently inundated **AND** not exposed due to frequent, erratic and often erosive water fluctuations; includes all terrestrial habitats and wetlands dominated by emergent (herbaceous or woody) vegetation at some point during a normal year c
- b. Ground permanently inundated **OR** exposed due to frequent, erratic and often erosive water fluctuations; includes vegetated areas dominated by floating-leaved or submerged herbaceous vegetation at height of growing season; rivers, ponds, lakes and shores **II. AQUATIC & SHORE HABITATS**

- c. Exposed mineral ground (excluding ice) typically <20% aerial cover; if more, not due to steep topography, xeric conditions, or severe disturbance; meadows, shrublands, and forests d
- c. Exposed mineral ground >20% aerial cover due to steep topography, xeric conditions, or severe disturbance; dunes, cliffs, and soil barrens **III. BARREN HABITATS**

- d. Vascular plant cover >50% woody e
- d. Vascular plant cover <50% woody **IV. MEADOW HABITATS**

- e. Woody plant cover <50% trees; includes pussy willow (*Salix discolor*) and dwarf shrublands **V. SHRUBLAND HABITATS**
- e. Woody plant cover >50% trees; includes apple (*Malus* spp.) and hawthorn (*Crataegus* spp.) thickets **VI. FOREST HABITATS**

I. CULTURAL HABITATS

- a. Terrestrial areas used for agriculture b
- a. Areas completely altered for active human use, such as for habitation or transportation **A. Developed**

- b. Areas used for crop production; rowcrops, orchards, nurseries, etc **B. Cropland**
- b. Areas used for livestock; pastures **C. Grazeland**

A. Developed (CD)

- a. Area not permanently inundated b
- a. Area permanently inundated **1. Developed Aquatic Habitat**

- b. Area >20% vegetated e
- b. Area <20% vegetated c

- c. At-grade ground surface or structure d
- c. Above-grade structure **2. Artificial Structure**

- d. Surface artificial **3. Artificial Surface**
- d. Surface natural **4. Developed Natural Surface**

- e. Vascular plant cover <30% woody **5. Herbaceous Landscape**
- e. Vascular plant cover >30% woody **6. Wooded Landscape**

- 1. Developed Aquatic Habitat (CDAA).** Actively maintained and often artificial aquatic habitats such as swimming pools, detention basins, fish hatcheries and developed ponds; may also include portions of natural waters that are heavily used or repeatedly disturbed by humans, such as boat ramps, artificial beaches or similar features. [syn: >Artificial Beach, >Artificial pool (NY)]

-
2. **Artificial Structure (CDBS).** Above-grade artificial structures, such as buildings, shelters, porches and boardwalks. [syn: >Urban Structure, >Rural Structure, >Barn/agricultural building, >Non-agricultural building (NY)]
 3. **Artificial Surface (CDBA).** Various at-grade artificial pavements, such as brick, concrete or asphalt. Includes roads, drives, parking lots, patios and the like. [syn: >Paved Road/Path (NY)]
 4. **Developed Natural Surface (CDBN).** Exposed natural soil, aggregate, or rock surfaces, such as gravel drives, compacted lots, roadside shoulders, landfills, active railroads, active quarries, and similar areas; typically unvegetated due to compacted, contaminated, nutrient-poor, or dry conditions resulting from recent or chronic disturbance. [syn: >Unpaved Road/Path, >Railroad, >Gravel/Sand Mine, >Rock Quarry, >Riprap/Erosion Control Roadside, >Junkyard/Landfill (NY)]
 5. **Herbaceous Landscape (CDVH).** Maintained turf, gardens, and borders with minimal or no woody cover. [syn: >Flower/Herb Garden, >Mowed Lawn, >Mowed/ Herbicide-sprayed Roadside/Pathway (NY)]
 6. **Wooded Landscape (CDVT).** Maintained landscapes with significant woody shrub or tree cover, usually with a mowed turfgrass understory, such as parks, arboreta, and residential yards. [syn: >Mowed Lawn With Trees (NY)]

B. Cropland (CC)

- a. Vascular plant cover <30% woody.....b
- a. Vascular plant cover >30% woody..... **1. Wooded Cropland**
- b. Exposed ground <20%; untilled ground perennially dominated by herbaceous cover..... **2. Hayfield**
- b. Exposed ground >20%; tilled ground often completely exposed for portion of the year..... **3. Tillage**

1. **Wooded Cropland (CCW).** Includes shrub and tree orchards, vineyards, nurseries and similar wooded agricultural landscapes; may be structurally divided into forest and shrubland subtypes. [syn: >Orchard, >Vineyard (NY)]
2. **Hayfield (CCH)** Fields mowed one-several times annually for hay or straw production. Subtypes may be divided based on hydrology or species composition. They typically consist of coolseason grasses with a mix of native and exotic forbs, but may also contain a high percentage of legumes to produce high-quality forage. [syn: =Cropland/Field Crops (NY)]
3. **Tillage (CCT).** Land used for rowcrops or otherwise intensively and repeatedly disturbed. [syn: =Cropland/Row Crops (NY)]. Three subtypes are recognized based on hydrology:
 - a. **Upland Tillage (CTU).** Well-drained tilled agricultural ground outside of floodplains; if left fallow, sites would naturally develop into an upland community.
 - b. **Floodplain Tillage (CCTR).** Tilled agricultural ground on well-drained floodplain soils; if left fallow, sites would naturally develop into a floodplain community.
 - c. **Wetland Tillage (CTP).** Tilled agricultural ground on saturated, often black, organic soils; frequently ditched or tiled to allow adequate drainage; if left fallow, sites would develop into a palustrine community. [syn: ≈Reverted Drained Muckland (NY)]

C. Grazeland (CG)

Fenced pasture areas typically used for herbivorous browsers such as cows, horses, sheep, goats, alpacas, or fowl; may be divided into subtypes based on livestock, browse intensity, and landscape position. [syn: =Pastureland (NY)]

II. AQUATIC & SHORE HABITATS

- a. Lotic (flowing water) systems, such as streams, rivers and adjacent shorelines **A. Riverine Systems**
- a. Lentic (stillwater) systems, such as ponds, lakes, reservoirs and adjacent shorelines..... **B. Stillwater Systems**

A. Riverine Systems (AR)

- a. Ground inundated during normal conditions..... b
- a. Ground exposed due to erratic and often erosive water fluctuations, but not normally inundated; shores and bars c

- b. Herbs >20% cover at height of growing season d
- b. Herbs <20% cover at height of growing season e

- c. Substrate >50% bedrock, boulders, cobble, gravel or sand..... **1. Riverine Rocky Shore**
- c. Substrate >50% detritus, mud or silt **2. Riverine Mudflat**

- d. Herbaceous cover >50% floating-leaved species (see Table 1) **3. Riverine Floating-Leaved Marsh**
- d. Herbaceous cover <50% floating-leaved species, vegetation primarily submersed **4. Riverine Submergent Marsh**

- e. Watershed 1-20 sq mi **5. Unvegetated Headwater Stream**
- e. Watershed >20 sq mi..... **6. Unvegetated River**

- 1. Riverine Rocky Shore (ARHR).** Sand and gravel bars, depositional point bars, and rocky flats along streams; substrate is well-drained and coarse-textured, typically xeric during most of the growing season, yet frequently inundated with fast-moving water during seasonal flood events; commonly occurring species include cocklebur (*Xanthium strumarium*), horsetails (*Equisetum* spp.), coltsfoot (*Tussilago farfara*), mugwort (*Artemisia vulgaris*), flatsedges (*Cyperus* spp.), spurges (*Euphorbia* spp.) and other ruderal weeds and seedlings. [syn: ≈Riverside Sand/Gravel Bar, >Cobble Shore (NY);= CEGL002408, >CEGL004103 **G3** (NS)]
- 2. Riverine Mudflat (ARHM).** Sparsely vegetated mudflats associated with slow, gradual hydrologic fluctuations along flowing water systems; sites may be inundated for much of the growing season, frequently drawing down by late summer and/or during drought periods; substrate is fine silt, clay and detritus; vegetation is scattered and ephemeral, and may include flatsedges (*Cyperus* spp.), coltsfoot (*Tussilago farfara*), smartweeds (*Persicaria* spp.), and various tree and forb seedlings. [syn: ≈CEGL002314 (NS)]
- 3. Riverine Floating-leaved Marsh (ARFR).** Occurring in sluggish waters of large streams, in quiet backwaters and floodplain ponds, and as part of headwater stream-marshland complexes; usually bordered by a submersed, deep-water community towards the main current and shallow-water emergent communities shoreward; common species include spatterdock (*Nuphar lutea* ssp. *advena*), pondweeds (*Potamogeton* spp.), and duckweeds (*Lemna* spp., *Spirodela polyrhiza*); a submergent community may be present underneath. [syn: <Backwater Slough, <Marsh Headwater Stream (NY); =Floating-leaved Riverine Community (OH)]
- 4. Riverine Submergent Marsh (ARSR).** Occurring in stable, relatively deep, flowing waters; may occur in similar situations as the previous community, but differing in the lack of floating-leaved species; typically bordered by unvegetated deep water towards the main current and an emergent and/or floating-leaved community shoreward; common species include pondweeds (*Potamogeton* spp., *Stuckenia* spp.), waterweeds (*Elodea* spp.), water-milfoil (*Myriophyllum* spp.), waternymph (*Najas* spp.), and eelgrass (*Vallisneria americana*); filamentous algae may be abundant; circumscription of this community is poorly understood as many sites have been severely degraded due to stream channel alterations, pH and nutrient fluctuations, and increased turbidity as the result of human activities. [syn: <Backwater Slough, <Marsh Headwater Stream (NY); =Submergent Riverine Community (OH)]

-
- 5. **Unvegetated Headwater Stream (ARUU).** Watershed 1-20 sq mi; typically shallow, rocky-bottomed, high-gradient waterways; rarely large enough to be considered a distinct habitat because they are often overshadowed by tree cover and thus better treated as a component of a forest community; bryophyte cover may be extensive on rocks of stable streams. [syn: >Rocky Headwater Stream, >Intermittent Stream (NY)]
 - 6. **Unvegetated River (ARUL).** Large rivers with >20 sq mi watersheds, typically having fast-flowing or deep waters; substrate type and water clarity varies widely from river to river, and often within the length of a single channel. [syn: <Confined River, <Deepwater River, <Unconfined River (NY)]

B. Stillwater Systems (AS)

Lentic systems, often separated into palustrine (<20 acre) and lacustrine (>20 acre) water bodies, have been combined here due to overlap in the types of plant communities. Unvegetated aquatic habitats are classified horizontally based on overall size and depth, because these factors affect seasonal turnover frequency which changes the overall environment. The upper, limnetic surface waters typically contain the warmer, oxygenated epilimnion and support the most productive biological community. The shoreward horizontal region where the benthic substrate is within the epilimnion is referred to as the littoral zone. Deeper systems contain a hypolimnion, which is the harsh, dark, anoxic environment located below the epilimnion. Water bodies containing a well-developed hypolimnion mix once or twice annually creating distinct systems. The seaward horizontal region, where the benthic community is within the hypolimnion is the profundal zone and is generally referred to as pelagic.

- a. Ground inundated during normal conditions.....d
- a. Ground exposed during normal conditions from erratic and often erosive water fluctuations; shores.....b
- b. Substrate >50% unconsolidated material c
- b. Substrate >50% consolidated material, such as boulder or bedrock **1. Stillwater Rocky Shore**
- c. Substrate >50% cobble, gravel, or sand..... **2. Stillwater Beach**
- c. Substrate >50% silt or mud**3. Stillwater Mudflat**
- d. Herbaceous cover <20% at height of growing season.....h
- d. Herbaceous cover >20% at height of growing season.....e
- e. Herbaceous cover >50% floating-leaved species (see Table 1)f
- e. Herbaceous cover <50% floating-leaved species; vegetation primarily submersedg
- f. Free floating-leaved cover (see Table 1) >30%; suspended plants **4. Duckweed Marsh**
- f. Free floating-leaved cover <30%; rooted plants **5. Stillwater Floating-Leaved Marsh**
- g. Submergent vegetation (see Table 1) <50% exotic **6. Native Stillwater Submerged Marsh**
- g. Submergent vegetation >50% exotic..... **7. Exotic Stillwater Submerged Marsh**
- h. Habitats occurring within waterbodies <20 acres in area (palustrine); typically without a wave-formed shorei
- h. Habitats occurring within waterbodies >20 acres in area (lacustrine); typically >20 ft deep and with a wave-formed shorej
- i. Substrate exposed to light; water <20(-30) ft deep; littoral zone**8. Unvegetated Pond Shallows**
- i. Substrate always dark; water >20(-30) ft deep; **RARE**.....**9. Pond Pelagic Zone**
- j. Substrate always dark; water >20(-30) ft deep k
- j. Substrate exposed to light; water <20(-30) ft deep **10. Unvegetated Lake Shallows**

- k. Inland lake or reservoir **11. Inland Lake Pelagic Zone**
 k. Great lake; Lake Erie **12. Great Lake Pelagic Zone**

Table 1. Representative Aquatic Plants by Leaf Position.

Species	Submerged	Floating	Free-floating	Species	Submerged	Floating	Free-floating	Species	Submerged	Floating	Free-floating
<i>Brasenia schreberi</i>		X		<i>Potamogeton amplifolius</i>	X	X		<i>Potamogeton robinsii</i>	X		
<i>Cabomba caroliniana</i>	X			<i>Potamogeton crispus</i>	X			<i>Potamogeton spirillus</i>	X	X	
<i>Ceratophyllum demersum</i>	X			<i>Potamogeton diversifolius</i>	X	X		<i>Potamogeton strictifolius</i>	X		
<i>Chara</i> spp. (algae)	X			<i>Potamogeton epihydrus</i>	X	X		<i>Potamogeton vaseyi</i>	X	X	
<i>Eichhornia crassipes</i>		X	X	<i>Potamogeton foliosus</i>	X			<i>Potamogeton zosteriformes</i>	X		
<i>Elodea</i> spp.	X			<i>Potamogeton friesii</i>	X			<i>Riccia</i> spp. (liverwort)		X	X
<i>Hydrilla verticillata</i>	X			<i>Potamogeton gramineus</i>	X	X		<i>Ricciocarpos</i> spp. (liverwort)		X	X
<i>Isoetes</i> spp.*	X			<i>Potamogeton hillii</i>	X			<i>Sagittaria</i> spp.*	X		
<i>Lemna</i> spp.		X	X	<i>Potamogeton illinoensis</i>	X	X		<i>Spirodela polyriza</i>		X	X
<i>Myriophyllum</i> spp.	X			<i>Potamogeton natans</i>	X	X		<i>Stuckenia</i> spp.	X		
<i>Najas</i> spp.	X			<i>Potamogeton nodosus</i>	X	X		<i>Utricularia</i> spp.	X		
<i>Nelumbo lutea</i>		X		<i>Potamogeton perfoliatus</i>	X			<i>Vallisneria americana</i>	X		
<i>Nitella</i> spp. (algae)	X			<i>Potamogeton praelongus</i>	X			<i>Wolffia</i> spp.		X	X
<i>Nuphar</i> spp.		X		<i>Potamogeton pulcher</i>	X	X		<i>Zanichellia palustris</i>	X		
<i>Nymphaea</i> spp.		X		<i>Potamogeton pusillus</i>	X			<i>Zosterella dubia</i> *	X		

* may also be emergent

- 1. Stillwater Rocky Shore (ASHC).** Rock and cliff shores where persistent vegetation is absent or sparse due to intense wave and wind action. [syn: =Shoreline Outcrop (NY); =CEGL002508 (NS)]
- 2. Stillwater Aggregate Shore (ASHU).** Unvegetated aggregate shoreline exposed due to intense wind, wave and ice weathering; typically the transitional zone from the terrestrial, sparsely vegetated environments above the active driftline to the normally inundated aquatic environments. [syn: <Inland Non-calcareous Lake Shore, ≈Sand Beach, >Cobble Shore (NY)]
- 3. Stillwater Mudflat (ASHM).** Spontaneous communities of wet, muddy shores temporarily exposed during summer drawdown periods; substrate is silt or clay mixed with organic detritus or marl; stranded rooted or floating aquatics may occur along with various flatsedges (*Cyperus* spp.), rushes (*Juncus* spp.), smartweeds (*Persicaria* spp.), spike-rushes (*Eleocharis acicularis*, *E. obtusa*), and water plantain (*Alisma subcordatum*). [syn: <Inland Non-calcareous Lake Shore (NY); =CEGL002313 (NS)]
- 4. Duckweed Marsh (ASFD).** Frequent in shallow, stagnant ponds with unstable water levels; on larger ponds, cover may be intermittent and windblown; duckweeds (*Lemna* spp., *Spirodela polyrhiza*) and water-meal (*Wolffia* spp.) are dominant, often forming a complete mat on the water surface; mosquitofern (*Azolla caroliniana*) and bogmat (*Wolffiella gladiata*) and liverworts (see Table 1) are occasional; a submergent community is sometimes present below, typically weedy with coontail (*Ceratophyllum demersum*) and waterweed (*Elodea* spp.); algae often abundant. [syn: <Floating-leaved Marsh (OH)]
- 5. Stillwater Floating-leaved Marsh (ASFR).** Common and widespread in ponds, lakes, disconnected oxbows, beaver ponds, and shallow water basins of all kinds; often occurring as a distinct zone between open water submergent communities and emergent communities shoreward; common associates include waterlily

(*Nymphaea odorata*), spatterdock (*Nuphar lutea*), American lotus (*Nelumbo lutea*), pondweeds (*Potamogeton* spp.), watershield (*Brasenia schreberi*), water smartweed (*Persicaria amphibia*) and duckweeds (*Lemna* spp., *Spirodela polyrhiza*); See Table 1 for additional species. [syn: <Backwater Slough, <Bog Lake, <Eutrophic Pond, <Oxbow Lake (NY); =Floating-leaved Marsh (OH); >Spatterdock-Waterlily Wetland (PA); >CEGL002386 (NS)]. In many sites a single species is dominant, leading to the recognition of distinct subtypes:

- a. **Spatterdock Marsh (ASFRa).** Herbaceous cover >50% spatterdock (*Nuphar lutea* ssp. *advena*); common, often forming monotypic stands in shallow ponds and lakes; waterlily (*Nymphaea odorata*) and watershield (*Brasenia schreberi*) are occasional associates; coontail (*Ceratophyllum demersum*), pondweeds (*Potamogeton* spp.), and bladderworts (*Utricularia* spp.) are frequent submergent species. [syn: <Spatterdock-Waterlily Wetland (PA); <CEGL002386 (NS)]
 - b. **Waterlily Floating-leaved Marsh (ASFRb).** Herbaceous cover >50% waterlily (*Nymphaea odorata*); similar to Spatterdock Marshes but more often associated with deeper waters. [syn: <Spatterdock-Waterlily Wetland (PA); <CEGL002386 (NS)]
 - c. **Watershield Floating-leaved Marsh (ASFRc).** Herbaceous cover >50% watershield (*Brasenia schreberi*); more often in smaller ponds and shallower waters than the previous two subtypes; the tendency to develop in recently created or disturbed ponds suggests this community may be somewhat seral, eventually giving way to Spatterdock Marshes in deeper waters or emergent communities in more shallow situations.
6. **Native Stillwater Submerged Marsh (ASSR).** In stable water basins of all kinds; occurring in depths up to 15 ft or more, depending on water clarity; in some ponds, only submergent vegetation may be present, in others a submergent community is present beneath floating-leaved and/or emergent vegetation; community associations are variable and largely dependent on water depth, temperature, pH, substrate, and strength of wave energy; coontail (*Ceratophyllum demersum*) is perhaps the most commonly encountered species and may be dominant in disturbed or “weedy” ponds; other representative species include bladderworts (*Utricularia* spp.), pondweeds (*Potamogeton* spp., *Stuckenia* spp.), waternymph (*Najas* spp.), eelgrass (*Vallisneria americana*), waterweeds (*Elodea* spp.), horned pondweed (*Zannichellia palustris*) and water-milfoils (*Myriophyllum* spp.); although few now remain, pristine examples of native submergent marshes harbor many state-endangered and rare species, including water-marigold (*Bidens beckii*), American water-milfoil (*Myriophyllum sibiricum*), various pondweeds (*P. gramineus*, *P. natans*, *P. richardsonii*, *P. zosteriformis*), and bladderworts (*U. cornuta*, *U. geminiscapa*, *U. intermedia*, *U. minor*). [syn: <Backwater Slough, <Bog Lake, <Eutrophic Pond, <Marl Pond, <Oxbow Lake (NY); =Submergent Marsh (OH); <CEGL002282, >CEGL005152 **G3G4** (NS)]
7. **Exotic Stillwater Submerged Marsh (ASSE).** Occurring in similar situations as the previous community but differing in the higher proportion of exotic species, most significantly Eurasian water-milfoil (*Myriophyllum spicatum*); other problematic invasive species include curly pondweed (*Potamogeton crispus*), brittle waternymph (*Najas minor*), and hydrilla (*Hydrilla verticillata*); due to the tendency of these species to form dense monocultures, the distinction of several single-species subtypes may be warranted. [syn: <Eutrophic Pond (NY); >Submergent Marsh (OH); <CEGL002282 (NS)]
8. **Unvegetated Pond Shallows (ASPL).** Includes permanent and seasonal open water ponds, typically with a silt, detritus or muck substrate. [~Eutrophic Pond (NY)]
9. **Pond Pelagic Zone (ASPP).** This deepwater pond habitat is rare, if at all represented within the region. Due to its unique characteristics, the warm and cold vertical strata typically remain unmixed, creating a stable meromictic environment. [~Meromictic Lake (NY)]
10. **Unvegetated Lake Shallows (ASLL).** Erosive, littoral shoals along lacustrine shorelines and shallows; also includes shallow inland lakes, which typically produce a winter-stratified monomictic environment. (>Great Lakes Exposed Shoal, >Winter-Stratified Monomictic Lake (NY))

-
11. **Inland Lake Pelagic Zone (ASLP).** Deepwater zones of inland lakes and reservoirs; these conditions typically produce a dimictic lake environment, with lake turnover occurring biannually (late spring and fall). [~Dimictic Lake types (NY)]
 12. **Great Lake Pelagic Zone (ASLG).** Represented by the deepwater areas of Lake Erie, which have a summer-stratified monomictic lake environment. [=Great Lakes Deepwater Community (NY)]

III. BARREN HABITATS

- a. Occurring inland, not on Lake Erie sand dunes b
- a. Occurring on sand dunes adjacent to Lake Erie; **RARE** **A. Dune Barrens**
- b. Occurring on loose aggregate or soil, not on rock **B. Soil Barrens**
- b. Occurring on conglomerate bedrock and rock outcroppings..... **C. Rock Barrens**

A. Dune Barrens (BD)

- a. Vegetation not hydrophytic, typically xeric b
- a. Vegetation hydrophytic; **VERY RARE** **IV.C.1. Interdunal Wetland**
- b. Vascular plant cover >30% C
- b. Vascular plant cover <30%; **RARE** **1. Great Lakes Sand Beach**
- c. Tree canopy cover <20%; **RARE** **2. Beachgrass Sand Dune**
- c. Tree canopy cover >20%; **RARE** **3. Wooded Dune**

1. **Great Lakes Sand Beach (BDSB).** Restricted to shores of Lake Erie, typically occurring as the first vegetation zone beyond the drift line; sea-rocket (*Cakile edentula*) is diagnostic; other associates include silverweed (*Argentina anserina*), beachgrass (*Ammophila breviligulata*), cocklebur (*Xanthium strumarium*), seaside sandmat (*Chamaesyce polygonifolia*) and willows (*Salix* spp.). [syn: <Sand Beach (NY), <Beach-Dune Community (OH); =Great Lakes Region Sparsely Vegetated Beach (PA); =CEGL005162 **G3** (NS)]
2. **Beachgrass Dune (BDUG).** Typically occurring in a zone between the previous community and the next; beachgrass (*Ammophila breviligulata*) is characteristic and often co-dominant with (or occasionally replaced by) other xeric grass species (*Elymus canadensis*, *Panicum virgatum*, *Schizachyrium scoparium*, *Sorghastrum nutans*); scattered forbs may include wild bean (*Strophostyles helvola*), beach wormwood (*Artemisia campestris*), beach pea (*Lathyrus japonicus*), silverweed (*Potentilla anserina*), sheep sorrel (*Rumex acetosella*), and Muhlenberg's sedge (*Carex muhlenbergii*); cottonwood (*Populus deltoides*) and willows (*Salix* spp.) may occur as isolated shrubs and stunted trees. [syn: <Great Lakes Dunes (NY); <Beach-Dune Community (OH); =Great Lakes Region Dry Sandplain (PA); =CEGL005098 (NS)]
3. **Wooded Dune (BDUW).** Occurring on stable dune ridges and sandy plains farther inland than the previous two communities; cottonwood (*Populus deltoides*) dominates the canopy along with scattered eastern red-cedar (*Juniperus virginiana*) and oaks (*Quercus* spp.); woody associates include willows (*Salix* spp.), hoptree (*Ptelea trifoliata*), bayberry (*Myrica pensylvanica*), northern poison ivy (*Toxicodendron rydbergii*), riverbank grape (*Vitis riparia*), and Virginia creeper (*Parthenocissus quinquefolia*); the groundcover stratum shares many species in common with the previous community; exotic honeysuckles (*Lonicera* spp.) and Oriental bittersweet (*Celastrus orbiculatus*) may become problematic. [syn: <Beach-Dune Community (OH); <Great Lakes Dunes (NY); Great Lakes Region Bayberry-Cottonwood Community (PA); =CEGL005119 **G1G2** (NS)]

B. Soil Barrens (BS)

- a. Occurring on steep, eroding banks of ravines and stream valleys **1. Eroding Banks**
- a. Occurring on relatively flat and stable soils.....b

- b. Vascular plant cover >30% woody; trees usually present, especially oaks (*Quercus* spp.) c
- b. Vascular plant cover <30% woody; trees sparse or absent **IV.A. Upland Meadows**

- c. Pine (*Pinus* spp.) present **2. Pine Barren**
- c. Pine absent **3. Oak Barren**

- 1. Eroding Banks (BSER).** Highly unstable, steep exposures of unconsolidated materials occurring along streams and river valleys; the substrate may be xeric or moist in seepage areas; soil development is absent, minimal, or confined to top rim; vegetation is variable and dynamic; frequently encountered species include juniper (*Juniperus* spp.), hazelnut (*Corylus americana*), horsetails (*Equisetum* spp.), coltsfoot (*Tussilago farfara*), alumroot (*Heuchera americana*), dwarf dandelion (*Krigia biflora*), and yellow pimpernel (*Taenidia integerrima*); some sites develop a prairie-like association with typical prairie grasses (*Andropogon gerardii*, *Schizachyrium scoparium*, *Sorghastrum nutans*) and forbs (*Silphium* spp., *Euphorbia corollata*, *Symphytotrichum laeve*, etc.); several regionally rare species such as stiff gentian (*Gentiana quinquefolia*) and buffaloberry (*Shepherdia canadensis*) are known to occur in this habitat. [syn: <Erosional Slope/Bluff (NY); =CEGL002315 (NS)]

- 2. Oak Barren (BSTO).** Regionally rare; restricted to well-drained, sandy glacial deposits and xeric ridge tops; oaks (*Quercus velutina*, *Q. alba*, rarely *Q. prinus*) dominate the canopy in an open woodland-like setting; ericaceous shrubs (*Vaccinium* spp., *Gaylussacia baccata*) and hazelnut (*Corylus americana*) are common understory associates; herbaceous species include bracken fern (*Pteridium aquilinum*), poverty grass (*Danthonia spicata*), Pennsylvania sedge (*Carex pennsylvanica*), bush clovers (*Lespedeza* spp.), pinweeds (*Lechea* spp.), and occasionally remnant prairie-like species. [syn: ≈Oak Openings (NY); =Oak Savanna, ≈Sand Barren (OH); ≈Dry Oak-Heath Woodland (PA); =CEGL002492 **G3** (NS)]

- 3. Pine Barren (BSTP).** Regionally rare, more common to the north and southeast of the region, especially within the Unglaciaded Alleghany Plateau; pitch (*Pinus rigida*) and Virginia pine (*P. virginiana*) occur along with xeric oaks (*Q. alba*, *Q. velutina*, *Q. prinus*, *Q. coccinea*) and other acidophilic species over thin soils on eroding bluffs and other droughty upland sites; in disturbed seral examples, as on cleared ridge tops and along highway cuts, Scot's pine (*P. sylvestris*), an exotic species, may occur. [syn: =Oak-Pine Forest (OH); ≈Pitch Pine-Mixed Oak Forest, ≈Pitch Pine-Mixed Hardwood Woodland (PA)]

C. Rock Barrens (BR)

- a. Substrate sandstone b
- a. Substrate not sandstone; shale or limestone c

- b. Occurs on dry, exposed, typically south/west-facing outcroppings..... **1. Exposed Sandstone Outcrops**
- b. Occurs on moist, shaded, typically north/east-facing outcroppings..... **2. Shaded Sandstone Outcrops**

- c. Substrate shale **3. Shale Outcrops**
- c. Substrate calcareous; **RARE** **4. Calcareous Outcrops**

- 1. Exposed Sandstone Outcrops (BRSE).** Xeric communities of exposed, vertical cliff faces and ledges, especially south- or west-facing; much of the vegetation is confined to rock crevices and shallow, droughty soils over bedrock; woody species may include birch (*Betula alleghaniensis*, *B. populifolia*), serviceberry (*Amelanchier* spp.), lowbush blueberry (*Vaccinium* spp.), and huckleberry (*Gaylussacia baccata*); herbaceous species include upland bentgrass (*Agrostis perennans*), poverty grass (*Danthonia spicata*), bastard toadflax (*Comandra umbellata*), goldenrods (*Solidago nemoralis*, *S. bicolor*), and bluets (*Houstonia caerulea*); extensive mats of

various mosses and lichens are common. [syn: <Cliff Community (NY); <Non-calcareous Cliff Community (OH); =CEGL002045 (NS)]

- 2. **Shaded Sandstone Outcrops (BRSS)** Cool, shaded north- or east-facing cliff faces and ledges, often with areas of groundwater seepage; the sheltered, moist environment supports a greater range of species than observed on Exposed Outcrops, including many regionally rare northern species; common woody species include yellow birch (*Betula alleghaniensis*), hemlock (*Tsuga canadensis*), bush honeysuckle (*Diervilla lonicera*), red elderberry (*Sambucus pubens*), trailing arbutus (*Epigaea repens*), and partridgeberry (*Mitchella repens*); herbaceous species include numerous ferns (*Asplenium* spp., *Cystopteris fragilis*, *Dryopteris marginalis*, *D. intermedia*, *Osmunda cinnamomea*, *Polypodium virginianum*, *Phegopteris connectilis*), starflower (*Trientalis borealis*), small enchanter's nightshade (*Circaea alpina*), Canada mayflower (*Maianthemum canadense*), and sedges (*Carex communis*, *C. arctata*); a thriving non-vascular community of mosses and liverworts is typically present but inadequately inventoried. [syn: <Cliff Community (NY); <Non-calcareous Cliff Community (OH); =CEGL002287 (NS)]
- 3. **Shale Outcrops (BRSH)**. Includes actively eroding shale slopes and associated talus; substrate xeric or moist from groundwater seepage; soil formation is sparse; vegetation absent or if present, largely temporary, the dynamic nature of the habitat precluding development of distinct communities; horsetails (*Equisetum* spp.), little bluestem (*Schizachyrium scoparium*), coltsfoot (*Tussilago farfara*), herb-Robert (*Geranium robertianum*), and hairy beardtongue (*Penstemon hirsutus*) are potentially diagnostic; scrubby forms of Eastern red-cedar (*Juniperus virginiana*) and blackberries (*Rubus* spp.) are occasional woody plants. [=Shale Cliff and Talus Community (NY); <Great Lakes Region Scarp Complex (PA)]
- 4. **Calcareous Outcrops (BRCA)**. More common west and east of the region with very few regional examples; the community varies with exposure and available light and moisture; Eastern red-cedar (*Juniperus virginiana*) is common along with characteristic calciphilic ferns (*Asplenium rhizophyllum*, *Cystopteris bulbifera*, *Pellaea atropurpurea*), alumroot (*Heuchera americana*), columbine (*Aquilegia canadensis*), and wild hydrangea (*Hydrangea arborescens*). [syn: =Calcareous Cliff Community (NY); =Calcareous Cliff Community (OH); =Calcareous Opening/Cliff (PA)]

IV. MEADOW HABITATS

- a. Herbaceous cover hydrophytic; hydric soils and wetland hydrology often present b
- a. Herbaceous cover not hydrophytic; hydric soils and wetland hydrology absent **A. Upland Meadows**
- b. Area riverine **OR** within a floodplain **B. Riparian Meadows**
- b. Area not riverine **AND** not within a floodplain **C. Palustrine Meadows**

A. Upland Meadows (MU)

- a. Soils mineral, not organic b
- a. Soils organic; occurring on dredge soil or drained wetlands **1. Organic Field**
- b. Herbs <50% exotic d
- b. Herbs >50% exotic c
- c. Total herb cover >80%; vegetation dense, bare soil not visible **2. Exotic Seral Meadow**
- c. Total herb cover <80%, primarily consisting of low, annual weeds; patches of bare aggregate or soil visible
..... **3. Dry Poor Field**
- d. Herbs >20% prairie grass species (*Andropogon* spp., *Panicum virgatum*, *Schizachyrium scoparium*,
Sorghastrum nutans, *Aristida* spp., *Sporobolis* spp., etc.) e
- d. Herbs <20% prairie grass species **4. Native Seral Meadow**

- e. Grasses >50% tallgrass species (*Andropogon gerardii*, *Sorghastrum nutans*, *Panicum virgatum*); **RARE**.....
 **5. Tallgrass Prairie**
 e. Grasses <50% tallgrass species; **RARE** **6. Shortgrass Prairie**

1. **Organic Field (MUSO).** Composition variable, consisting mainly of weedy annuals and perennials; characteristic species include pokeweed (*Phytolacca americana*), stinging nettle (*Urtica dioica*), Canada thistle (*Cirsium arvense*), black mustard (*Brassica nigra*), climbing buckwheat (*Polygonum scandens*, *P. convolvulus*) and ragweed (*Ambrosia* spp.). [syn: <Dredge spoils, ≈Reverted Drained Muckland (NY)]
2. **Exotic Seral Meadow (MUSU).** Common early-successional communities of disturbed open areas such as old agricultural fields, abandoned pastures and gardens, vacant lots, right-of-ways, and clearings; sod-forming, cool-season grasses (*Agrostis* spp., *Bromus inermis*, *Dactylis glomerata*, *Festuca* spp., *Phleum pratense*, *Poa* spp.) dominate the herbaceous cover along with various exotic and native forbs, including Queen Anne’s lace (*Daucus carota*), thistles (*Cirsium* spp.), dogbane (*Apocynum cannabinum*), milkweed (*Asclepias syriaca*), oxeye daisy (*Chrysanthemum leucanthemum*), goldenrods (*Solidago* spp.), and asters (*Symphotrichum* spp.); occasional shrubs include blackberries (*Rubus* spp.), multiflora rose (*Rosa multiflora*), and tree saplings. [syn: <Successional Old Field (NY); >CEGL005249, >CEGL006692 (NS)]
3. **Dry Poor Field (MUSP).** Typical of highly disturbed poor soils of brownfields, abandoned railways, parking lots and waste places; common species include clovers (*Trifolium* spp.), prostrate knotweed (*Polygonum aviculare*), bird’s-foot trefoil (*Lotus corniculatus*), chicory (*Cichorium intybus*), plantains (*Plantago* spp.), mulleins (*Verbascum* spp.), knapweeds (*Centaurea* spp.), spurge (*Euphorbia* spp., *Chamaesyce* spp.) and crabgrass (*Digitaria* spp.); tree-of-heaven (*Ailanthus altissima*) is an occasional tree. [syn: >Urban Vacant Lot (NY)]
4. **Native Seral Meadow (MUSR).** Differing from Exotic Seral Meadows in the higher proportion of native species, but often sharing many of the same species, the distinction thus somewhat arbitrary. [syn: <Successional Old Field (NY)]. Two distinct subtypes may be recognized:
 - a. **Goldenrod Meadow (MUSRa).** Herbs >50% Canada goldenrod (*Solidago canadensis*), often forming extensive stands in late-seral old fields; common associates include asters (*Symphotrichum pilosum*, *S. novae-angliae*, *S. lanceolatum*), wrinkleleaf goldenrod (*S. rugosa*), burdock (*Arctium* spp.), thistles (*Cirsium* spp.) and exotic grasses; blackberries (*Rubus* spp.) and gray dogwood (*Cornus racemosa*) are occasional shrubs.
 - b. **Dry Acid Meadow (MUSRb).** A distinct albeit variable community developing over dry acidic soils in forest openings (especially *Acer rubrum*-*Nyssa sylvatica* associations), borrow pits and scrapes, and disturbed areas bordering drained peat bogs; fruticose lichens (*Cladonia* spp., *Cladina* spp.) and haircap mosses (*Polytrichum* spp.) are common and perhaps diagnostic, along with broom-sedge (*Andropogon virginicus*), little bluestem (*Schizachyrium scoparium*), poverty grass (*Danthonia spicata*), dewberries (*Rubus flagellaris*, *R. hispida*), hairy-leaved sedge (*Carex hirsutella*), milkworts (*Polygala* spp.), and clubmosses (*Lycopodium* spp.). [syn: ≈Little Bluestem-Pennsylvania sedge opening (PA)]
5. **Tallgrass Prairie (MUNT).** Regionally occurring only as small, isolated remnants; tallgrass species (*Andropogon gerardii*, *Sorghastrum nutans*, *Panicum virgatum*) dominate along with bergamot (*Monarda fistulosa*), Ohio spiderwort (*Tradescantia ohioensis*), and various composites (*Helianthus* spp., *Ratibida pinnata*, *Rudbeckia hirta*, *Silphium terebinthinaceum*). [syn: =Big Bluestem Prairie (OH); ≈CEGL005096 **G2**, ≈CEGL002203 **G1G2**, CEPS006691 (NS)]
6. **Shortgrass Prairie (MUNS).** Restricted to well-drained or poor natural soils and eroding shale slumps; vegetation is usually sparse; little bluestem (*Schizachyrium scoparium*) and rough dropseed (*Sporobolus* spp) are characteristic; tallgrass species may be present but in low amounts; other grasses may include poverty grass (*Danthonia spicata*), threeawn (*Aristida* spp.), broom-sedge (*Andropogon virginicus*), and Canada bluegrass (*Poa compressa*); broadleaf associates include gray goldenrod (*Solidago nemoralis*), flowering spurge (*Euphorbia corollata*), tall coreopsis (*Coreopsis tripteris*), whorled rosinweed (*Silphium trifoliatum*), and

nodding onion (*Allium cernuum*). [syn: =Little Bluestem Prairie (OH); >Little Bluestem-Pennsylvania sedge Opening (PA); =CEGL005099, (NS)]

B. Riparian Meadows (MR)

- a. Area riverine, located within a stream or river channel; riverine marshes c
- a. Area not riverine, not located within a stream or river channel b
- b. Herbs >50% Japanese knotweed (*Fallopia japonica*) **1. Knotweed Floodplain Thicket**
- b. Herbs <50% Japanese knotweed **2. Seral Floodplain Meadow**
- c. Herbs >20% waterwillow (*Justicia americana*) **3. Waterwillow Riverine Marsh**
- c. Herbs <20% waterwillow **4. Rich Riverine Marsh**

- 1. Knotweed Floodplain Thicket (MRKN).** Dense, monotypic stands occurring over well-drained, loose soils in disturbed areas and along rivers and streams, especially in depositional point bars; associates include lady's thumb (*Persicaria maculosa*), garlic mustard (*Alliaria petiolata*), and, in riverine habitats, Japanese stiltgrass (*Microstegium vimineum*); box-elder (*Acer negundo*) and silver maple (*Acer saccharinum*) are occasional seedlings. [syn: =CEGL008472 (NS)]
- 2. Seral Floodplain Meadow (MRSR).** Herbaceous communities of open areas adjacent to streams; soils are typically rich and well-drained, rarely inundated or only briefly inundated due to high soil porosity; stands occur above channelized streams and along naturally or culturally disturbed streambanks; the herbaceous community is variable; common associates include stinging nettle (*Urtica dioica*), smooth goldenrod (*Solidago gigantea*), false sunflower (*Heliopsis helianthoides*), and wingstem (*Verbesina alternifolia*); reed canarygrass (*Phalaris arundinacea*) and Japanese stiltgrass (*Microstegium vimineum*) are common invaders: in such cases, recognition of an "Exotic Floodplain Meadow" subtype may be warranted.
- 3. Waterwillow Riverine Marsh (MRWW).** Communities of limited size dominated by waterwillow (*Justicia americana*), often occurring as pure stands; restricted to active stream floodplains and gravel bars where few other species can persist due to repeated disturbance; stands may exhibit a "migratory" distribution, shifting locations in response to changes in stream channel morphology; occasional associates include smartweeds (*Persicaria* spp.), lizard's tail (*Saururus cernuus*), horsetails (*Equisetum* spp.), sandbar willow (*Salix interior*), and stunted tree saplings (*Platanus occidentalis*, *Populus deltoides*). [syn: =Water-willow Riverine Community (OH); =Water-willow (*Justicia Americana*)-Smartweed Riverbed Community (PA); =CEGL004286 (NS)]
- 4. Rich Riverine Marsh (MRRC).** Emergent or partially emerged communities of slow-moving riverine waters and adjacent wet shores with best developed examples occurring near river headwaters and freshwater estuaries along Lake Erie; the herbaceous community includes various bulrushes (*Scirpus* spp., *Schoenoplectus* spp.), sedges (*Carex* spp.), bur-reeds (*Sparganium* spp.), spatterdock (*Nuphar lutea* ssp. *advena*), smartweeds (*Persicaria* spp., especially *P. pensylvanica* and *P. lapathifolium*), pickerelweed (*Pontederia cordata*), and cattails (*Typha* spp.); lanceleaf fogfruit (*Phyla lanceolata*) and lizard's tail (*Saururus cernuus*) are less common but may be characteristic of this habitat type. [syn: =Mixed Emergent Riverine Community (OH)]

C. Palustrine Meadows (MP)

- a. Herbaceous cover >50%, communities not associated with Lake Erie shore dunes b
- a. Herbaceous cover often <50%; community occurring on moist sandy flats along Lake Erie shore; **VERY RARE**.
..... **1. Interdunal Wetland**
- b. Cover <50% swamp loosestrife (*Decodon verticillata*) c
- b. Cover >50% swamp loosestrife **V.C.3. Swamp Loosestrife Dwarf Shrubland**

- c. Sphagnum moss absent or sparse, <20% cover; bog indicators (see Table 2) absent.....d
- c. Sphagnum mat more or less continuous, having >20% cover, usually much more; bog indicators present;
RARE **2. Sphagnum Bog**
- d. Fen indicators (see Table 2) absent; community consisting of more common generalist species e
- d. Fen indicators present, often including regionally rare species; **RARE** **3. Herbaceous Fen**
- e. Herbs <50% skunk cabbage (*Symplocarpus foetidus*)..... f
- e. Herbs >50% skunk cabbage (at peak of growing season)..... **4. Open Skunk Cabbage Seep**
- f. Herbs <50% cattail (*Typha* spp.)..... g
- f. Herbs >50% cattail..... **5. Cattail Marsh**
- g. Herbs <30% river bulrush (*Schoenoplectus fluviatilis*)..... h
- g. Herbs >30% river bulrush **6. River Bulrush Marsh**
- h. Herbs <50% sedges (*Carex* spp.)..... i
- h. Herbs >50% sedges, often rhizomatous **7. Sedge Marsh**
- i. Herbs >70% graminoids (Poaceae, Cyperaceae, Juncaceae) **8. Marsh Grass-Sedge Meadow**
- i. Herbs <70% graminoids **9. Rich Stillwater Marsh**

Table 2. Common Bog & Fen Indicators.⁸

Bog Indicators		Fen Indicators	
<i>Calla palustris</i>	<i>Scheuchzeria palustris</i>	<i>Carex flava</i>	<i>Rhamnus alnifolia</i>
<i>Carex atlantica</i> ssp. <i>capillacea</i>	<i>Sphagnum</i> spp.	<i>Carex sterilis</i>	<i>Rhynchospora capillacea</i>
<i>Carex echinata</i>	<i>Vaccinium corymbosum</i>	<i>Carex stricta</i>	<i>Salix candida</i>
<i>Carex oligosperma</i>	<i>Vaccinium macrocarpon</i>	<i>Deschampsia caespitosa</i>	<i>Salix myricoides</i>
<i>Carex trisperma</i>	<i>Vaccinium oxycoccos</i>	<i>Eleocharis rostellata</i>	<i>Salix serissima</i>
<i>Chamaedaphne calyculata</i>	<i>Woodwardia virginica</i>	<i>Eriophorum viridicarinaratum</i>	<i>Solidago ohioensis</i>
<i>Decodon verticillatus</i>	<i>Xyris difformis</i>	<i>Gentianopsis</i> spp.	<i>Tofieldia glutinosa</i>
<i>Eriophorum virginicum</i>		<i>Lobelia kalmii</i>	<i>Triglochin maritimum</i>
<i>Larix laricina</i>		<i>Parnassia glauca</i>	<i>Triglochin palustre</i>
<i>Nemopanthus mucronatus</i>		<i>Potentilla fruticosa</i> (= <i>Dasiphora</i> f.)	<i>Zigadenus elegans</i> var. <i>glauca</i>

- 1. Interdunal Wetland (MPID).** Restricted to low, seasonally wet flats between sand dunes along Lake Erie; characteristic species include rushes (*Juncus articulatus*, *J. arcticus*, *J. alpinoarticulatus*), flatsedges (*Cyperus bipartitus*, *C. flavescens*), sedges (*Carex viridula*, *C. garberi*) and large St. Johns-wort (*Hypericum majus*). [syn: <Beach-Dune Community (OH); =Great Lakes Region Palustrine Sandplain (PA)]
- 2. Sphagnum Bog (MPSB).** An open bog community with minimal shrub cover (<25%); soils are saturated peat; typical associates include sedges (*Carex oligosperma*, *C. trisperma*), three-way sedge (*Dulichium arundinaceum*), cottongrass (*Eriophorum virginicum*), purple pitcherplant (*Sarracenia purpurea*), sundews (*Drosera* spp.), and cranberry (*Vaccinium oxycoccos*, *V. macrocarpon*). [syn: =Sphagnum Bog (OH); =Sphagnum-Beaked Rush Peatland (PA); =CEGL005256 (NS)]
- 3. Herbaceous Fen (MPRF).** Alkaline or circumneutral wetlands supported by groundwater seepage and springs; soils are marl or peat; scattered shrubs such as shrubby cinquefoil (*Dasiphora fruticosa*) may be present (<50% cover), in some areas grading into Cinquefoil Shrub Fen, the distinction becoming arbitrary; herbaceous associates are characteristically diverse and may include beaked spikerush (*Eleocharis rostellata*), Kalm's lobelia (*Lobelia kalmii*), arrowgrass (*Triglochin* spp.), smooth sawgrass (*Cladium mariscoides*), marsh goldenrod (*Solidago uliginosa*), and various sedges (*Carex flava*, *C. sterilis*, *C. leptalea*, *C. stricta*); extensive moss cover is

usually present, though Sphagnum spp. may be absent; chara is common in open water areas. [syn: <Marl Fen, ≈Rich Graminoid Fen (NY); =Cinquefoil-Sedge Fen (OH); ≈Open Sedge Fen (PA); =CEGL005140 **G3** (NS)]

4. **Open Skunk Cabbage Seep (MPFC).** Associated with permanent groundwater sources, especially springs; canopy cover is sometimes present due to neighboring trees, but woody vegetation rooted in seep not exceeding 50% cover; common herbaceous associates include jewelweed (*Impatiens capensis*), purplestem angelica (*Angelica atropurpurea*), clearweed (*Pilea* spp.), turtlehead (*Chelone glabra*), swamp goldenrod (*Solidago patula*) and swamp saxifrage (*Saxifraga pensylvanica*). [syn: ≈Skunk Cabbage-Golden Saxifrage Forest Seep (PA); =CEGL002385 (NS)]
5. **Cattail Marsh (MPCA).** Common and widespread; shallow- or deep-water marshes occurring in landscape depressions, along margins of ponds, lakes, and streams, and in impoundments; soils are mineral or organic, inundated for most of the year with water depth varying from several inches up to 3 ft; cattail may occur as the sole dominant or in association with bulrushes (*Scirpus* spp., *Schoenoplectus* spp.), sedges (*Carex* spp.), arrowhead (*Sagittaria latifolia*), bur-reeds (*Sparganium* spp.), lesser clearweed (*Pilea fontana*), and marsh fern (*Thelypteris palustris*); duckweed (*Lemna minor*) is a common floating aquatic. [syn: =Cattail Marsh (OH); =Cattail Marsh (PA); <Deep Emergent Marsh, <Shallow Emergent Marsh (NY); =CEGL002233, =CEGL006153, >CEGL002229, >CEGL002026, <CEGL005112 **G3G4** (NS)] Two subtypes may be recognized:
 - a. **Exotic Cattail Marsh (MPCAx).** Cattail >50% exotic species (*T. angustifolia*, *T. x glauca*); stands commonly monotypic, characteristic of highly disturbed marshes and manmade wetlands.
 - b. **Native Cattail Marsh (MPCAn).** Cattail >50% native species (*T. latifolia*); stands typically more diverse and occurring in minimally disturbed or pristine wetlands.
6. **River Bulrush Marsh (MPGB).** Community uncommon, occurring in river floodplains and along lakeshores; stands are often monotypic but may include patches of cattail (*Typha* spp.), bur-reeds (*Sparganium* spp.), woolgrass (*Scirpus cyperinus*), and smartweeds (*Persicaria* spp.). [syn: <Shallow Emergent Marsh (NY); <Mixed Emergent Marsh (OH); <Bulrush Marsh (PA); =CEGL002026, =CEGL002221 **G3G4** (NS)]
7. **Sedge Marsh (MPGL).** Sedge-dominated communities occurring in floodplains and oxbows, landscape depressions, and shallow margins and inlets of ponds and lakes; often a single rhizomatous species is dominant, such as lake sedge (*Carex lacustris*), hairyfruit sedge (*C. trichocarpa*), or Northwest Territory sedge (*C. utriculata*); other commonly encountered species include tussock sedge (*C. stricta*), fringed sedge (*C. crinita*), Emory's sedge (*C. emoryi*), bur-reeds (*Sparganium* spp.), swamp aster (*Symphytotrichum puniceus*, *S. firmum*), and smartweeds (*Persicaria* spp.); a number of subtypes may be defined based on the dominant sedge species present. [syn: <Shallow Emergent Marsh, ≈Sedge Meadow (NY); <Sedge-Grass Meadow (OH); >Tussock Sedge Marsh (PA); >CEGL002256, >CEGL002258 (NS)]
8. **Marsh Grass-Sedge Meadow (MPGS).** A broad community type describing wet areas dominated by members of the grass (Poaceae), sedge (Cyperaceae), and rush (Juncaceae) families; occurring along stream floodplains, in shallow upland depressions, and along pond margins; soils are mineral or shallow peat, often with an upper layer of dense root mass; standing water, if present, is typically shallow, the water table often retreating to subsurface levels by summer; the herbaceous cover includes a diverse mix of monocot species: bulrushes (*Scirpus* spp., *Schoenoplectus* spp.), rushes (*Juncus* spp.), sedges (*Carex vulpinoidea*, *C. lurida*, *C. scoparia*, *C. cristatella*, *C. tribuloides*, *C. stipata*, *C. granularis*), spike-rushes (*Eleocharis* spp.), and numerous grasses (*Agrostis gigantea*, *Calamagrostis canadensis*, *Glyceria* spp., *Leersia oryzoides*, *Phalaris arundinacea*, *Phragmites australis*, *Poa* spp.); characteristic broadleaf associates include boneset (*Eupatorium perfoliatum*), swamp milkweed (*Asclepias incarnata*), goldenrods (*Solidago* spp.), St. John'sworts (*Hypericum* spp.), and Joe-pye-weeds (*Eutrochium* spp.). [syn: <Shallow Emergent Marsh (NY); <Sedge-Grass Meadow (OH); >Bluejoint-Reed canarygrass Marsh, ≈Wet Meadow, >Bulrush Marsh (PA); >CEGL004112, >CEGL005174, >CEGL002026, ≈CEPS006690 (NS)] In many disturbed sites, a single species may dominate, leading to the recognition of distinct subtypes:

- a. **Reed Canarygrass Meadow (MPGSa).** Herbs >50% reed canarygrass (*Phalaris arundinacea*), forming extensive monotypic stands in seasonally saturated soils of floodplains and low areas of all kinds; bluejoint (*Calamagrostis canadensis*) is an occasional co-dominant. [syn: >Bluejoint-Reed Canarygrass Marsh (PA); =CEGL006044 (NS)]
- b. **Phragmites Marsh (MPGSb).** Herbs >50% common reed (*Phragmites australis*), forming dense monotypic stands of tall culms, effectively excluding all other vegetation; found in poorly-drained areas of all kinds, including saline sites; purple loosestrife (*Lythrum salicaria*) and willows (*Salix nigra*, *S. discolor*) are occasional associates. [syn: =Reedgrass-Purple Loosestrife Marsh, <Dredge Spoil Wetland (NY); =CEGL004141 (NS)]
- c. **Rice Cutgrass Marsh (MPGSc).** Herbs >50% rice cutgrass (*Leersia oryzoides*), occurring with woolgrass (*Scirpus cyperinus*), swamp milkweed (*Asclepias incarnata*), tearthumb (*Persicaria sagittata*, *P. arifolia*), lurid sedge (*Carex lurida*), jewelweed (*Impatiens capensis*) and scattered cattails (*Typha* spp.); shrubs (*Cornus amomum*, *Salix* spp.) are occasionally present and may grade into shrub swamps. [syn: ≈CEGL006461 (NS)]
- d. **Wild Rice Marsh (MPGSd).** Herbs >50% wild rice (*Zizania aquatica*, *Z. palustris*). Historically present in the region but now locally rare or possibly extirpated; occurring along streams and lakes, especially sites prone to frequent erosion and re-deposition due to continual water movement.

9. **Rich Stillwater Marsh (MPRC).** Communities of shallow- or deep-water habitats, the herbaceous assemblage dependent on the prevailing water level, pH, and disturbance history; differing from sedge and grass marshes in the significant component of non-graminoid emergent species such as bur-reeds (*Sparganium* spp.), arrow arum (*Peltandra virginica*), spatterdock (*Nuphar advena*), pickerelweed (*Pontederia cordata*), arrowheads (*Sagittaria* spp.), cattails (*Typha* spp.), water docks (*Rumex* spp.), marsh fern (*Thelypteris palustris*), water-plantain (*Alisma subcordatum*), purple loosestrife (*Lythrum salicaria*), and smartweeds (*Persicaria* spp.); occasional shrubs (<50% cover) include arrowwood (*Viburnum dentatum*, *V. recognitum*), swamp rose (*Rosa palustris*), swamp loosestrife (*Decodon verticillatus*), and willows (*Salix* spp.). [syn: <Deep Emergent Marsh, <Shallow Emergent Marsh (NY); =Mixed Emergent Marsh (OH); =Mixed Forb Marsh, >Pickerelweed-Arrow Arum-Arrowhead Wetland (PA); >CEGL004291 (NS)]. Several commonly occurring subtypes may be recognized:

- a. **Bur-reed Marsh (MPRCa).** Herbs >50% bur-reed (*Sparganium eurycarpum*, *S. americanum*); monotypic stands frequently forming part of an emergent marsh mosaic along the margins of ponds and in shallow upland depressions. [syn: <CEGL002026 (NS)]
- b. **Sweetflag Marsh (MPRCb).** Herbs >50% sweetflag (*Acorus calamus*); similar to Bur-reed Marshes in appearance and distribution.
- c. **Smartweed Marsh (MPRCc).** Herbs >50% smartweed (*Persicaria* spp.); occurring in seasonally inundated depressions and small ponds (including beaver ponds), often as an early seral community type; rice cutgrass (*Leersia oryzoides*), water purslane (*Ludwigia palustris*), flat-sedges (*Cyperus* spp.), and barnyard grass (*Echinochloa* spp.) are frequent associates.

V. SHRUBLAND HABITATS

- a. Vascular plants hydrophytic **OR** within an active floodplain b
- a. Vascular plants not hydrophytic **AND** not within an active floodplain..... **A. Upland Shrublands**
- b. Area within an active floodplain..... **B. Riverine Shrublands**
- b. Area not within an active floodplain **C. Palustrine Shrublands**

A. Upland Shrublands (SU)

- a. Grape vine (*Vitis* spp.) cover <50% in shrub layer b
- a. Grape vine cover >50% in shrub layer; suppressed or collapsed trees present **1. Grape Thicket**

- b. Shrubs <50% tree species C
- b. Shrubs >50% tree species **2. Seral Tree Thicket**
- c. Shrubs >50% exotic (see Table 3) **3. Exotic Shrubland**
- c. Shrubs <50% exotic **4. Native Shrubland**

- 1. Grape Thicket (SUGR).** Characteristic of forest openings where grape vines (*Vitis aestivalis*, *V. riparia*, *V. vulpina*) have caused significant canopy collapse; a tangled mass of vinery envelops entire shrubs, dwarfed trees and downed woody debris; the shrub layer often includes spicebush (*Lindera benzoin*), blackberries (*Rubus* spp.), and exotic shrubs; herbaceous cover is usually a mix of preexisting woodland vegetation with various wind- or animal-dispersed, shade-intolerant species such as pilewort (*Erechtites hieracifolia*) and pokeweed (*Phytolacca americana*).
- 2. Seral Tree Thicket (SUTR).** Temporary forest communities typical of canopy blowdowns, forest edges, and clearcuts; though similar in appearance to Exotic and Native Shrublands, the high proportion of vigorously growing sapling tree species distinguishes this transitional community. [syn: <Brushy Cleared Land (NY)]
- 3. Exotic Shrubland (SUEX).** Disturbed areas overrun by a suite of exotic invasive species such as multiflora rose (*Rosa multiflora*), autumn olive (*Elaeagnus umbellata*), privet (*Ligustrum vulgare*), glossy buckthorn (*Frangula alnus*), nonnative crabapples (*Malus* spp.), and honeysuckles (*Lonicera morrowii*, *L. tatarica*, *L. maackii*); herbaceous cover is highly variable, but Canada goldenrod (*Solidago canadensis*), dogbane (*Apocynum cannabinum*), asters (*Symphotrichum* spp.), and various grasses (*Poa pratensis*, *Anthoxanthum odoratum*, *Phalaris arundinacea*, *Phleum pretense*) are common. [syn: <Successional Shrubland, <Brushy Cleared Land (NY); <CEGL005207 (NS)]
- 4. Native Shrubland (SUNA).** Somewhat stable communities of disturbed open areas; differing from Exotic Shrublands in the higher proportion of native shrub species, such as sumac (*Rhus* spp.), gray dogwood (*Cornus racemosa*), blackberries (*Rubus* spp.), elderberry (*Sambucus canadensis*), and hawthorns (*Crataegus* spp.); herbaceous cover is similar to that of Exotic Shrublands; due to the clonal growth of some of the aforementioned shrub species, recognition of subtypes may be warranted. [syn: <Successional Shrubland, <Brushy Cleared Land (NY); <CEGL003207 (NS)]

B. Riverine Shrublands (SR)

- a. Shrubs >50% sandbar willow (*Salix interior*) **1. Sandbar Willow Shrubland**
- a. Shrubs <50% sandbar willow **2. Seral Riverine Thicket**

- 1. Sandbar Willow Shrubland (SRSW)** Small communities limited to streambanks and gravelly, sandy islands in streams; trees are absent or severely stunted due to constant disturbance; temporary shrubby thickets of sycamore (*Platanus occidentalis*) or cottonwood (*Populus occidentalis*) saplings may develop, these eventually destroyed by major flooding events; groundcover stratum is variable, consisting of scattered seedlings, annual weeds, and stoloniferous perennials. [syn: =CEGL005078 (NS)]
- 2. Seral Riverine Thickets (SRST).** Temporary communities occurring on highly disturbed ground along high-gradient streams and large rivers; rapidly regenerating woody species are common, including river grape (*Vitis riparia*), cottonwood (*Populus deltoides*), sycamore (*Platanus occidentalis*) and willows (*Salix* spp.); the groundcover stratum, if present, consists of ruderal weeds and seedlings. [syn: ≈CEGL003901 (NS)]

C. Palustrine Shrublands (SP)

Scrub-shrub habitats are often thought of and treated as areas dominated by woody vegetation 4.5-20 ft tall. In this document, and specifically in this section, we have included dwarf shrublands, communities dominated by woody vegetation <4.5 ft tall. Furthermore, because shrublands may grow in rather deep waters, shrub height is herein considered from normal water surface elevation.

- a. Shrub species >50% in shrub (and/or tree) stratum (>4.5 ft tall); d
- a. Shrub species >50% in ground stratum (<4.5 ft tall); dwarf shrublands b
- b. Shrubby cinquefoil (*Dasiphora fruticosa*) and other fen indicators (see Table 2) absent c
- b. Shrubby cinquefoil and often other fen indicators present; **VERY RARE** **1. Cinquefoil Shrub Fen**
- c. Shrub species >50% leatherleaf (*Chamaedaphne calyculata*); **RARE** **2. Leatherleaf Bog**
- c. Shrub species >50% swamp loosestrife (*Decodon verticillata*) **3. Swamp Loosestrife Dwarf Shrubland**
- d. Shrubs <50% alder (*Alnus* spp.) e
- d. Shrubs >50% alder **4. Alder Shrub Swamp**
- e. Sphagnum sparse or absent, not forming a continuous mat; bog indicators (see Table 2) absent g
- e. Sphagnum present, often forming a near continuous mat; bog indicators present f
- f. Shrubs >50% highbush blueberry (*Vaccinium corymbosum*) and huckleberry (*Gaylussacia baccata*); **RARE** **5. Tall Heath Bog**
- f. Shrubs <50% highbush blueberry and huckleberry **6. Rich Shrub Bog**
- g. Shrubs <50% buttonbush (*Cephalanthus occidentalis*) c
- g. Shrubs >50% buttonbush **7. Buttonbush Shrub Swamp**
- h. Shrubs <50% willow (*Salix* spp.) i
- h. Shrubs >50% willow **8. Willow Shrub Swamp**
- i. Shrubs >70% silky dogwood (*Cornus amomum*), gray dogwood (*C. racemosa*), arrowwood (*Viburnum dentatum*, *V. recognitum*), blackberries (*Rubus alleghaniensis*, *R. pensilvanicus*, *R. occidentalis*), and exotic species (see Table 3) combined **9. Seral Shrub Swamp**
- i. Shrubs not as above; communities more diverse, usually three or more species present **10. Rich Shrub Swamp**

- 1. Cinquefoil Shrub Fen (SPCF).** Alkaline or weakly acidic wetlands supported by groundwater seepage; marl soils usually present; shrubby cinquefoil is a diagnostic species; other shrub associates include alder-leaved buckthorn (*Rhamnus alnifolia*), ninebark (*Physocarpus opulifolius*), and shrub willows (including the rare *Salix candida* and *S. serissima*); the herbaceous community is rich with characteristic fen species such as Kalm’s lobelia (*Lobelia kalmii*), grass-of-Parnassus (*Parnassia glauca*), and various sedges (*Carex leptalea*, *C. sterilis*, *C. stricta*, etc.); *Campylium stellatum* is a characteristic moss, along with *Sphagnum* spp.; *Chara* spp. is commonly present. [syn: <Marl Fen, <Rich Shrub Fen (NY); =Cinquefoil-Sedge Fen (OH), ≈Buckthorn (*Rhamnus alnifolia*)-Sedge-Golden Ragwort Fen (PA); =CEGL005140 **G3**, <CEGL005088 **G2** (NS)]
- 2. Leatherleaf Bog (SPHL).** Restricted to peat soils of kettlehole depressions in glacial topography; occurring as pure stands or as a distinct low shrub zone bordering tall shrub communities; swamp loosestrife (*Decodon verticillata*) and cranberries (*Vaccinium* spp.) are occasional low-growing woody associates; common herbaceous species include cottongrass (*Eriophorum virginicum*), three-way sedge (*Dulichium arundinaceum*), marsh St. Johnswort (*Triadenum virginicum*), Virginia chainfern (*Woodwardia virginica*), and sedges (*Carex atlantica*, *C. canescens*, *C. echinata*, *C. oligosperma*); a continuous sphagnum mat is present. . [syn: =Dwarf Shrub Bog (NY); =Leatherleaf Bog (OH); >Leatherleaf-Cranberry Peatland, >Leatherleaf-Sedge Wetland (PA); =CEGL005092 **G3G4**, ≈CEGL006008 (NS)]
- 3. Swamp Loosestrife Dwarf Shrubland (SPSL).** Rarely found over wide areas; restricted to shallow margins and inlets of lakes, ponds, streams, and bogs; either occurring as pure stands or mixed with emergent herbaceous vegetation; buttonbush (*Cephalanthus occidentalis*) is occasional; herbaceous associates include spatterdock (*Nuphar lutea* ssp. *advena*), waterlily (*Nymphaea odorata*), tufted loosestrife (*Lysimachia thyrsiflora*), cattails

(*Typha* spp.), and bladderworts (*Utricularia* spp.). [syn: <Shrub Swamp (NY); =Water-willow (*Decodon verticillatus*) Shrub Wetland (PA); =CEGL005089 (NS)]

4. **Alder Shrub Swamp (SPAL).** Smooth alder (*Alnus serrulata*) and/or speckled alder (*A. incana*) are dominant, sometimes forming a distinct “canopy” with shorter shrub species below; stands occur over muck soils, varying from circumneutral to somewhat acidic but lacking the extensive sphagnum cover and acidophilic indicators (Table 2) of bog communities; black ash (*Fraxinus nigra*) and red maple (*Acer rubrum*) may occur as isolated trees; additional shrub associates include viburnums (*Viburnum dentatum*, *V. lentago*, *V. recognitum*), dogwoods (*Cornus amomum*, *C. sericea*), and willows (*Salix* spp.); common herbaceous plants include skunk cabbage (*Symplocarpus foetidus*), marsh marigold (*Caltha palustris*), jewelweed (*Impatiens capensis*), bedstraws (*Galium* spp.), ferns (*Osmunda* spp., *Onoclea sensibilis*), and sedges (*Carex stricta*, *C. lacustris*); glossy buckthorn (*Frangula alnus*) and bittersweet nightshade (*Solanum dulcamara*) are frequent invaders. [syn: <Shrub Swamp, <Rich Shrub Fen (NY); =Alder Shrub Swamp (OH); =Alder-Sphagnum Wetland, ≈Alder-Ninebark Wetland (PA); >CEGL002381, >CEGL005082 (NS)]
5. **Tall Heath Bog (SPHT).** Differing from Rich Shrub Bogs in the nearly complete cover of highbush blueberry (*Vaccinium corymbosum*); huckleberry (*Gaylussacia baccata*) may be co-dominant; catberry (*Nemopanthus mucronata*) and winterberry (*Ilex verticillata*) are occasional associates; the dense shrub growth often competitively excludes tree seedlings and herbaceous species; sphagnum moss is usually present. [syn: =Highbush Blueberry Bog Thicket (NY); =<Tall Shrub Bog (OH); =Highbush Blueberry-Sphagnum Wetland (PA); =CEGL005085 **G2G3** (NS)]
6. **Rich Shrub Bog (SPRB).** Tall shrub associations occurring in kettleholes and peatlands in glacial topography; may form dense stands over large areas or appear as distinct zones between Leatherleaf Bog dwarf shrubland and Tamarack Bog forest; the shrub composition is variable; highbush blueberry (*Vaccinium corymbosum*) is most common, along with winterberry (*Ilex verticillata*), huckleberry (*Gaylussacia baccata*), catberry (*Nemopanthus mucronatus*), poison sumac (*Toxicodendron vernix*), chokeberry (*Aronia melanocarpa*), and red-osier dogwood (*Cornus sericea*); glossy buckthorn (*Frangula alnus*) is a frequent invader; the herbaceous cover may include cottongrass (*Eriophorum virginicum*), water arum (*Calla palustris*), ferns (*Osmunda cinnamomea*, *Woodwardia virginica*), sedges (*Carex canescens*, *C. trisperma*), and carnivorous plants (*Drosera* spp., *Sarracenia purpurea*); tamarack (*Larix laricina*) and red maple (*Acer rubrum*) are occasional trees (<50% cover, usually much less). [syn: >Highbush Blueberry Bog Thicket (NY); <Tall Shrub Bog (OH); <Highbush Blueberry-Meadowsweet Wetland (PA); = CEGL005083 (NS)]
7. **Buttonbush Shrub Swamp (SPBB).** Typically occurring as pure stands in open depressions and oxbows in woods; soils are inundated for much of the year; occasional shrub associates include swamp rose (*Rosa palustris*), swamp loosestrife (*Decodon verticillata*), and dogwoods (*Cornus amomum*, *C. sericea*); herbaceous species are mainly restricted to hummocks and commonly include blue skullcap (*Scutellaria lateriflora*), beggar-ticks (*Bidens* spp.), false nettle (*Boehmeria cylindrica*), water parsnip (*Sium suave*), and sedges (*Carex canescens*, *C. lacustris*); duckweed (*Lemna minor*) is a common floating-leaved aquatic; sphagnum moss is occasional. [syn: <Shrub Swamp (NY); =Buttonbush Shrub Swamp (OH); =Buttonbush Wetland (PA); =CEGL002190 (NS)]
8. **Willow Shrub Swamp (SPWI).** Minimally disturbed, often high-quality communities dominated by clonal willows or a mix of shrub willow species including silky willow (*Salix sericea*), pussy willow (*S. discolor*), shining willow (*S. lucida*), sandbar willow (*S. interior*), and rarely meadow willow (*S. petiolaris*); black willow (*S. nigra*) is an occasional tree; other common shrub associates include meadowsweet (*Spiraea alba*), swamp rose (*Rosa palustris*), and silky dogwood (*Cornus amomum*); the diverse herbaceous cover may include lake sedge (*Carex lacustris*), cattails (*Typha* spp.), jewelweed (*Impatiens capensis*), bedstraws (*Galium* spp.), and marsh fern (*Thelypteris palustris*). [syn: <Shrub Swamp (NY); <Mixed Shrub Swamp (OH); <CEGL002186, <CEGL005206 (NS)]

9. **Seral Shrub Swamp (SPSR).** Disturbed, species-poor shrub communities occurring over hydric or marginally hydric soils; glossy buckthorn (*Frangula alnus*) is often dominant along with dogwoods (*Cornus racemosa*, *C. amomum*) and arrowwood (*Viburnum dentatum*, *V. recognitum*); multiflora rose (*Rosa multiflora*) and blackberries are occasionally present in areas that aren't too wet; large monotypic stands of false indigo (*Amorpha fruticosa*) may also be included in this category; herbaceous cover usually consists of weedy species (*Solidago rugosa*, *Toxicodendron radicans*, *Symphytotrichum lateriflorum*, *Glyceria striata*) and relicts from the previous open seral community (*Solidago canadensis*, *Juncus effusus*, *Scirpus atrovirens*, *Anthoxanthum odoratum*); red maple (*Acer rubrum*), ash (*Fraxinus* spp.), and American elm (*Ulmus americana*) may be present as saplings or scattered trees, thus transitioning into Maple-Ash-Elm Swamp. [syn: <Shrub Swamp (NY); <Mixed Shrub Swamp (OH); ≈CEGL005206 (NS)]
10. **Rich Shrub Swamp (SPRC).** Minimally disturbed, stable communities supported by a relatively permanent groundwater source, often nutrient-rich and somewhat calcareous; the typically rich assemblage of shrub species may include willows (*Salix* spp.), swamp rose (*Rosa palustris*), meadowsweet (*Spiraea alba*), dogwoods (*Cornus amomum*, *C. sericea*), wild currants (*Ribes* spp.), and viburnums (*Viburnum dentatum*, *V. lentago*, *V. recognitum*); alders (*Alnus* spp.) and/or buttonbush (*Cephalanthus occidentalis*) are occasionally present; herbaceous cover is diverse, sometimes fen-like, and usually of much higher quality than Seral Shrub Swamp communities. [syn: ≈Shrub Swamp, ≈Rich Shrub Fen (NY); <Mixed Shrub Swamp (OH); >Highbush Blueberry-Meadowsweet Wetland (PA); =CEGL002186, ≈CEGL005087 **G2G3**, ≈CEGL005088 **G2** (NS)]

VI. FOREST HABITATS

- a. Trees <50% planted conifers b
a. Trees >50% planted conifers **A. Cultural Forests**
- b. Vegetation hydrophytic **OR** in a floodplain; hydric soils and wetland hydrology often present..... c
b. Vegetation not hydrophytic **AND** not in a floodplain..... **B. Upland Forests**
- c. Area within an active floodplain **C. Riparian Forests**
c. Area not within an active floodplain..... **D. Palustrine Forests**

Table 3. Typical Planted Conifers and Naturalized Exotic Woody Species.

Exotic/Planted Conifers	Exotic Broadleaf Trees	Exotic Shrubs
<i>Abies balsamea</i>	<i>Acer platanoides</i>	<i>Berberis thunbergii</i>
<i>Abies concolor</i>	<i>Aesculus hippocastanum</i>	<i>Elaeagnus umbellata</i>
<i>Abies fraseri</i>	<i>Ailanthus altissima</i>	<i>Eleutherococcus pentaphyllus</i>
<i>Larix decidua</i>	<i>Maclura pomifera</i>	<i>Euonymus alatus</i>
<i>Metasequoia glyptostroboides</i>	<i>Malus</i> spp. (except <i>M. coronaria</i>)	<i>Euonymus europaeus</i>
<i>Picea abies</i>	<i>Morus alba</i>	<i>Frangula alnus</i>
<i>Picea pungens</i>	<i>Populus alba</i>	<i>Ligustrum vulgare</i>
<i>Pinus nigra</i>	<i>Prunus avium</i>	<i>Lonicera maackii</i>
<i>Pinus sylvestris</i>	<i>Prunus cerasus</i>	<i>Lonicera morrowii</i>
<i>Pseudotsuga menziesii</i>	<i>Pyrus</i> spp.	<i>Lonicera tatarica</i>
	<i>Salix alba</i>	<i>Lonicera x bella</i>
Native/Planted Conifers	<i>Salix babylonica</i>	<i>Rhamnus cathartica</i>
<i>Juniperus virginiana</i>	<i>Salix fragilis</i>	<i>Rosa multiflora</i>
<i>Pinus banksiana</i>	<i>Tilia cordata</i>	<i>Viburnum opulus</i> var. <i>opulus</i>
<i>Pinus resinosa</i>	<i>Ulmus parviflora</i>	
<i>Pinus strobus</i>	<i>Ulmus procera</i>	
<i>Taxodium distichum</i>	<i>Ulmus pumila</i>	
<i>Tsuga canadensis</i>	<i>Zelkova serrata</i>	
<i>Tsuga caroliniana</i>		

A. Cultural Forests (FC)

- a. Conifers >50% exotic (see Table 3) to eastern North America **1. Exotic Conifer Plantation**
- a. Conifers <50% exotic **2. Native Conifer Plantation**

- 1. Exotic Conifer Plantation (FCCX).** Norway spruce (*Picea abies*) and Scots pine (*Pinus sylvestris*) are typical, often mixed with some white pine (*Pinus strobus*); a recovering native hardwood understory is often present or co-dominant, thus grading into Seral Forest types; the shrub layer may be depauperate or comprised of spicebush (*Lindera benzoin*), blackberries (*Rubus* spp.), chokecherry (*Prunus virginiana*), exotic species (especially *Frangula alnus*), and regenerating hardwood trees; ferns (*Dryopteris* spp.) and poison ivy (*Toxicodendron radicans*) are frequently abundant on the ground. [syn: <Pine Plantation, <Spruce/Fir Plantation, <Conifer Plantation (NY); <CEGL005208, >CEGL006408, >CEGL006686, >CEGL007167 (NS)]
- 2. Native Conifer Plantation (FCCN).** Stands dominated by white (*Pinus strobus*) or red pine (*P. resinosa*), hemlock (*Tsuga* spp.), or other native species; native conifer plantings potentially promote desirable native flora-fauna associations and may serve to naturally redistribute these species; a seral native hardwood understory is present in some stands; the shrub and groundcover strata may be barren or resemble those found in Exotic Conifer Plantations. [syn: <Pine Plantation, <Conifer Plantation (NY); >CEGL004730, <CEGL005208, >CEGL007178, >CEGL007178 (NS)]

B. Upland Forests (FU)

- a. Trees <20% hemlock (*Tsuga canadensis*) or white pine (*Pinus strobus*) b
- a. Trees >20% hemlock or white pine; typically co-dominant with mesic deciduous species **1. Conifer-Hardwood Forest**
- b. Trees <80% dry oaks (*Quercus* spp.; see Table 4) c
- b. Trees >80% dry oaks **2. Dry Oak Forest**
- c. Trees <20% oak (*Quercus* spp.), <20% hickory (*Carya* spp.) **AND** <70% combined d
- c. Trees >20% oak, >20% hickory **AND** >70% combined **3. Oak-Hickory Forest**
- d. Trees <20% oak (*Quercus* spp.), <20% maple (*Acer* spp.) **OR** <70% combined e
- d. Trees >20% oak, >20% maple **AND** >70% combined **4. Oak-Maple Forest**
- e. Trees <20% beech (*Fagus grandifolia*), <20% wet or mesic oaks (*Quercus* spp.; see Table 4), **OR** <20% red/silver maple (*Acer rubrum*, *A. saccharinum*) f
- e. Trees >20% beech, >20% wet or mesic oaks, **AND** >20% red/silver maple **5. Beech-Oak-Maple Forest**
- f. Trees <70% beech (*Fagus grandifolia*) and sugar maple (*Acer saccharum*) combined g
- f. Trees >70% beech and sugar maple combined **6. Beech-Maple Forest**
- g. Trees <70% hawthorn (*Crataegus* spp.) and crabapple (*Malus* spp.) combined h
- g. Trees >70% hawthorn and crabapple combined **7. Hawthorn-Apple Thicket**
- h. Trees <50% exotic (see Table 3) i
- h. Trees >50% exotic **8. Exotic Hardwood Forest**
- i. Trees >50% aspens (*Populus* spp.), sassafras (*Sassafras albidum*), black locust (*Robinia pseudoacacia*), crabapples (*Malus* spp.), hawthorns (*Crataegus* spp.), planted conifers, and exotic species (see Table 3) combined **OR** >50% of any of the following: red maple (*Acer rubrum*), ash (*Fraxinus* spp.), tuliptree (*Liriodendron tulipifera*), elm (*Ulmus* spp.), or black cherry (*Prunus serotina*) **9. Seral Forest**
- i. Trees not satisfying any of the conditions above j

- j. Trees >70% mesic species (see Table 4);**10. Rich Hardwood Forest**
 j. Trees <70% mesic species.....**11. Unclassified Hardwood Forest**

Table 4. Common Trees by Soil Moisture Preference.

Species	Indicator ⁹	Wet	Mesic	Dry	Species	Indicator	Wet	Mesic	Dry
<i>Acer negundo</i>	FAC	X			<i>Liquidambar styraciflua</i>	FAC	X		
<i>Acer rubrum</i>	FAC	X	X		<i>Liriodendron tulipifera</i>	FACU		X	
<i>Acer saccharinum</i>	FACW	X			<i>Magnolia acuminata</i>	UPL		X	
<i>Acer saccharum</i>	FACU		X		<i>Nyssa sylvatica</i>	FAC	X	X	
<i>Aesculus glabra</i>	FAC	X			<i>Platanus occidentalis</i>	FACW	X		
<i>Betula allegheniensis</i>	FAC	X	X		<i>Populus balsamifera</i>	FACW	X		
<i>Betula lenta</i>	FACU		X		<i>Populus deltoides</i>	FAC	X		
<i>Betula nigra</i>	FACW	X			<i>Populus heterophylla</i>	OBL	X		
<i>Carya cordiformis</i>	FAC	X	X		<i>Prunus serotina</i>	FACU		X	
<i>Carya glabra</i>	FACU		X	X	<i>Quercus alba</i>	FACU		X	X
<i>Carya laciniosa</i>	FACW	X	X		<i>Quercus bicolor</i>	FACW	X		
<i>Carya ovalis</i>	UPL			X	<i>Quercus coccinea</i>	UPL			X
<i>Carya ovata</i>	FACU		X		<i>Quercus imbricaria</i>	FACU		X	
<i>Carya tomentosa</i>	UPL			X	<i>Quercus macrocarpa</i>	FACU	X	X	
<i>Celtis occidentalis</i>	FAC	X	X		<i>Quercus muehlenbergii</i>	FACU		X	
<i>Crataegus crus-galli</i>	FAC	X			<i>Quercus palustris</i>	FACW	X		
<i>Crataegus mollis</i>	FAC	X			<i>Quercus prinus</i>	UPL			X
<i>Diospyros virginiana</i>	FAC		X		<i>Quercus rubra</i>	FACU		X	
<i>Fagus grandifolia</i>	FACU		X		<i>Quercus velutina</i>	UPL			X
<i>Fraxinus americana</i>	FACU		X		<i>Salix alba</i>	FACW	X		
<i>Fraxinus nigra</i>	FACW	X			<i>Salix amygdaloides</i>	FACW	X		
<i>Fraxinus pennsylvanica</i>	FACW	X			<i>Salix fragilis</i>	FAC	X		
<i>Fraxinus profunda</i>	OBL	X			<i>Salix nigra</i>	OBL	X		
<i>Gleditsia triacanthos</i>	FAC	X			<i>Tilia americana</i>	FACU		X	
<i>Juglans cinerea</i>	FACU		X		<i>Ulmus americana</i>	FACW	X		
<i>Juglans nigra</i>	FACU		X		<i>Ulmus rubra</i>	FAC	X	X	

- 1. Conifer-Hardwood Forest (FUMM).** Occurring in deep, moist ravines and cool, north-facing slopes; rarely on flat terrain; often associated with sandstone outcroppings; this type is defined by a significant coniferous species component and may grade into Beech-Maple or Rich Hardwood forests where found; beech (*Fagus grandifolia*), sugar maple (*Acer saccharum*) and yellow birch (*Betula alleghaniensis*) are common deciduous canopy co-dominants; witch-hazel (*Hamamelis virginiana*) and mapleleaf viburnum (*Viburnum acerifolium*) are common in the shrub layer; diagnostic herbaceous species include Canada mayflower (*Maianthemum canadense*), teaberry (*Gaultheria procumbens*), sweet white violet (*Viola blanda*), partridgeberry (*Mitchella repens*), shining clubmoss (*Lycopodium lucidulum*), and ferns (*Dryopteris* spp., *Polystichum acrostichoides*). [syn: =Hemlock-Northern Hardwood Forest (NY); =Hemlock-White Pine-Hardwood Forest (OH); =Hemlock (White Pine)-Northern Hardwood Forest (PA); >CEGL005043 **G3**, >CEGL006304 (NS)]
- 2. Dry Oak Forest (FUOD).** Oak-dominated forests of dry ridge tops and shallow acidic soils; scarlet oak (*Quercus coccinea*), black oak (*Q. velutina*), and chestnut oak (*Q. prinus*) are most characteristic along with white oak (*Q. alba*), shagbark hickory (*Carya ovata*), and black gum (*Nyssa sylvatica*); the shrub layer consists of ericaceous species (*Vaccinium* spp., i) and occasionally greenbrier (*Smilax* spp.); herbaceous associates include spotted wintergreen (*Chimaphila maculata*), Pennsylvania sedge (*C. pennsylvanica*), poverty grass (*Danthonia spicata*), and rattlesnake weed (*Hieracium venosum*); several regionally uncommon species such as downy false foxglove (*Aureolaria virginica*) and yellow false indigo (*Baptisia tinctoria*) are found in this habitat type. [syn:

≈Chestnut Oak Forest, ≈Allegheny Oak Forest (NY); =Appalachian Oak Forest (OH); ≈Dry Oak-Heath Forest (PA); ≈CEGL002068, ≈CEGL005030, ≈CEGL005023, ≈CEGL002059 (NS)]

3. **Oak-Hickory Forest (FUOH).** This type is distinguished from Dry Oak Forest by its significant hickory (*Carya* spp.) component. Examples occur on the middle and upper zones of slopes and on dry ridge tops and well-drained glacial deposits; soils are generally dry, shallow, and weakly to strongly acidic; canopy composition varies by slope position and available moisture, leading to the recognition of distinct subtypes (see below); various oaks and hickories dominate the canopy along with occasional specimens of black cherry (*Prunus serotina*), red maple (*Acer rubrum*), and black gum (*Nyssa sylvatica*); flowering dogwood (*Cornus florida*) and ironwood (*Ostrya virginiana*) are characteristic small trees with witch-hazel (*Hamamelis virginiana*) and greenbrier (*Smilax* spp.) in the shrub layer; herbaceous cover is sometimes sparse, but may include hogpeanut (*Amphicarpaea bracteata*), yellow violet (*Viola pubescens*), rattlesnake hawkweed (*Hieracium venosum*), bedstraws (*Galium circaezans*, *G. concinnum*), and sedges (*Carex pensylvanica*, *C. cephalophora*). [syn: =Appalachian Oak-Hickory Forest (NY); =Oak-Hickory Forest (OH), >Red Oak-Mixed Hardwood Forest (PA)] Two subtypes are recognized:
 - a. **Dry Oak-Hickory Forest (FUOHd).** Oak and hickory trees >30% dry species (see Table 4); community typically found on upper zones of slopes and dry ridge tops; chestnut (*Quercus prinus*), black (*Q. velutina*) and scarlet oak (*Q. coccinea*) are characteristic, along with pignut (*Carya glabra*), sweet pignut (*C. ovalis*), and occasionally mockernut hickory (*C. tomentosa*). [syn: =CEGL002076 (NS)]
 - b. **Mesic Oak-Hickory Forest (FUOHm).** Oak and hickory trees mostly mesic (<30% dry species, see Table 4); differing from the above in the tendency to be found on lower slope positions and terraces, as well as the species composition: red (*Quercus rubra*) and white oak (*Q. alba*) are frequent, along with shagbark (*C. ovata*), bitternut (*C. cordiformis*) and occasionally shellbark hickory (*C. laciniosa*). [syn: ≈CEGL002068 (NS)]
4. **Oak-Maple Forest (FUOM).** A community of flexible composition; generally occurring on moister soils than Dry Oak and Oak-Hickory Forests but on shallower, less fertile soils than Rich Hardwood and Beech-Maple Forests and thus not favoring development of the characteristic species associations of those forest types; typical canopy composition includes oaks (*Quercus* spp., especially *Q. alba* and *Q. rubra*), with either sugar (*Acer saccharum*) and/or red maple (*A. rubrum*) co-dominant or as a nearly pure subcanopy; tuliptree (*Liriodendron tulipifera*) and black cherry (*Prunus serotina*) are occasional associates; ironwood (*Ostrya virginiana*) is characteristic in the understory; the herbaceous cover is variable, but typically includes mayapple (*Podophyllum peltatum*), blue cohosh (*Caulophyllum thalictroides*), baneberry (*Actaea pachypoda*), Solomon's seal (*Polygonatum* spp.), early bluegrass (*Poa cuspidata*), and sedges (*Carex digitalis*, *C. pensylvanica*). [syn: =Oak-Maple Forest, >Oak-Maple-Tuliptree Forest (OH); =CEGL006125, ≈CEGL002461, >CEGL005010 (NS)]
5. **Beech-Oak-Maple Forest (FUBO).** Similar in composition to Oak-Maple Forest, but differing in the inclusion of significant amounts of beech (*Fagus grandifolia*); occurring on flat or hummocky terrain in mesic or somewhat poorly drained soils; vernal pools are frequent, the mosaic of wet depressions and upland hummocks supporting a diversity of wetland and upland species; American hornbeam (*Carpinus caroliniana*) and spicebush (*Lindera benzoin*) are common in the shrub layer; herbaceous cover is variable. [syn: =Beech-Oak-Red Maple Forest (OH); =CEGL005173 **G2G3** (NS)]
6. **Beech-Maple Forest (FUBM).** A common community of mesic soils and gentle slopes throughout the region; the canopy is dominated by beech (*Fagus grandifolia*) and sugar maple (*Acer saccharum*), though occasionally one of these species may be absent or present only in low amounts; canopy associates include a variety of mesic species such as tuliptree (*Liriodendron tulipifera*), cucumber magnolia (*Magnolia acuminata*), red maple (*Acer rubrum*), hickories (*Carya* spp.), and oaks (*Quercus* spp.); witch-hazel (*Hamamelis virginiana*) and maple-leaf viburnum (*Viburnum acerifolium*) are frequent in the shrub layer; herbaceous cover is characteristically rich with abundant spring ephemerals; common species include white trillium (*Trillium grandiflorum*), yellow fairybells (*Prosartes lanuginosa*), dwarf ginseng (*Panax trifolius*), false mermaid-weed (*Floerkea proserpinacoides*), wood phlox (*Phlox divaricata*), troutlily (*Erythronium americanum*), snakeroots (*Sanicula* spp.), sweet cicely (*Osmorhiza claytonii*), ferns (*Dryopteris* spp., *Osmunda claytoniana*, *Thelypteris*

noveboracensis), grasses (*Festuca subverticillata*, *Milium effusum*, *Poa alsodes*), and sedges (*Carex jamesii*, *C. laxiflora*, *C. laxiculmis*, *C. digitalis*, *C. rosea*, etc.); beech-drops (*Epifagus virginiana*), a parasite of beech roots, is common. [syn: =Beech-Maple Mesic Forest (NY); =Beech-Sugar Maple Forest (OH); <Tuliptree-Beech-Maple Forest (PA); =CEGL005013 **G2G3** (NS)]

7. **Hawthorn-Apple Thicket (FUTH).** Small-tree forests and dense thickets of relatively flat areas; weedy and seral in nature; in low, somewhat poorly drained sites this type may grade into Maple-Ash-Elm Swamp Forest; the shrub layer is dense or declining (due to closing canopy), usually dominated by exotic species (*Frangula alnus*, *Rosa multiflora*); herbaceous cover often includes relicts of the previous open seral community (*Penstemon digitalis*, *Scirpus atrovirens*, *Juncus effusus*, *Potentilla simplex*), along with more shade-tolerant species; white avens (*Geum canadense*) and poison ivy (*Toxicodendron radicans*) are frequent. [syn: <Successional Southern Hardwoods (NY)]
8. **Exotic Hardwood Forest (FUEX).** A provisional type with few observed examples but may be expected to occur more frequently in the future. A species of special concern is Norway maple (*Acer platanoides*), which has been observed to tolerate low light conditions in the understory of native forests and could potentially reach canopy dominance in some disturbed sites, especially those bordering residential areas and roadways. [<Urban Vacant Lot (NY)]
9. **Seral Forest (FUSR).** Seral forests are extremely variable in species composition but in appearance and structure are easily recognized in the field as a distinct community class; found on all types of soils, slopes and exposures, but most characteristic of areas with a recent disturbance history, especially sites occurring over old agricultural fields; trees are young (<60 yrs) and closely spaced with narrow canopies, either dominated by a single pioneering species or a combination of such species (see couplet for list of common species); the shrub layer may be depauperate or dominated by exotic species (*Rosa multiflora*, *Ligustrum vulgare*, *Lonicera* spp.); Oriental bittersweet (*Celastrus orbiculatus*) is a common vine; herbaceous cover is variable, typically a mix of exotic invasive species (*Alliaria petiolata*, *Hesperis matronalis*) and tolerant native species (*Persicaria virginiana*, *Geum canadense*, *Toxicodendron radicans*). [syn: =Successional Southern Hardwoods (NY); >Red Maple (Terrestrial) Forest, >Black Locust Forest (PA); >CEGL007279, ≈CEGL006684, >CEGL006687, >CEGL006693 (NS)]. Several subtypes may be recognized; only one commonly occurring type is given here:
 - a. **Red Maple Seral Forest (FUSRa).** Trees >50% red maple (*Acer rubrum*). Occasionally occurring as nearly pure stands, especially over former agricultural land; the shrub layer is depauperate; herbaceous cover is typically sparse but may include a mix of weedy exotic and native species such as poison ivy (*Toxicodendron radicans*), garlic mustard (*Alliaria petiolata*), white avens (*Geum canadense*), common cinquefoil (*Potentilla simplex*), and grasses (*Anthoxanthum odoratum*, *Poa alsodes*, *P. trivialis*, *Danthonia spicata*); patches of moss are common over areas of bare ground; coarse woody debris is often abundant. [=Red Maple (Terrestrial) Forest (PA)]
10. **Rich Hardwood Forest (FURC).** Young or mature forests with a diverse canopy (at least four different tree species present) but lacking distinct dominants; best examples are found over fertile, well-drained soils on flat or moderately sloping terrain; sometimes transitional between moist bottomland forests and drier upland communities; common trees include beech (*Fagus grandifolia*), sugar maple (*Acer saccharum*), tuliptree (*Liriodendron tulipifera*), basswood (*Tilia americana*), cucumber magnolia (*Magnolia acuminata*), bitternut hickory (*Carya cordiformis*), white ash (*Fraxinus americana*), and walnut (*Juglans* spp.); the shrub and groundcover strata are diverse and dependent on disturbance history, moisture, and soil pH. [syn: =Rich Mesophytic Forest (NY); =Mixed Mesophytic Forest (OH); ≈Mixed Mesophytic Forest, >Tuliptree-Beech-Maple Forest (PA); ≈CEGL006237 (NS)]
11. **Unclassified Hardwood Forest (FUUN).** Forests in this category represent communities of atypical or novel composition; variable by definition, they may include seral forests, edges, and transitional zones between more distinct community types.

C. Riparian Forests (FR)

- a. Trees >70% wet species (see Table 4)b
- a. Trees <70% wet species.....**1. Rich Floodplain Forest**
- b. Trees >50% sycamore (*Platanus occidentalis*), >50% cottonwood (*Populus deltoides*), >50% silver maple (*Acer saccharinum*), **AND** >70% combined;**2. Sycamore-Maple Floodplain Forest**
- b. Trees <50% sycamore, <50% cottonwood, <50% silver maple, **AND** <70% combined; hydric soils and surface water usually present**3. Wet Floodplain Forest**

- 1. Rich Floodplain Forest (FRRC).** Communities with a distinct mesic component, typically found on well-drained terraces along headwater streams that are seldom flooded (<once/yr.); canopy closely resembles some Rich Hardwood Forest types; sugar maple (*Acer saccharum*, especially var. *nigrum*, “black maple”), bitternut hickory (*Carya cordiformis*), black walnut (*Juglans nigra*), and basswood (*Tilia americana*) are characteristic species with hornbeam (*Carpinus caroliniana*) as a common small tree associate; the shrub and groundcover strata are highly variable with exotic species prevailing in more disturbed sites; in best-developed examples, a diverse array of spring ephemerals and woodland species is present, including wood phlox (*Phlox divaricata*), Jacob’s ladder (*Polemonium reptans*), violets (*Viola striata*, *V. rostrata*, *V. canadensis*), harbinger-of-spring (*Erigenia bulbosa*), sweet cicely (*Osmorhiza* spp.), creeping fragile fern (*Cystopteris protrusa*), and sedges (*Carex plantaginea*, *C. laxiculmis*, *C. prasina*, *C. jamesii*). [syn: <Floodplain Forest (NY); =Mixed Floodplain Forest (OH); =CEGL005014 **G2G3**, ≈CEGL006684, ≈CEGL006688 (NS)]
- 2. Sycamore-Maple Floodplain Forest (FRSH).** A widespread community of large river floodplains that are regularly flooded; canopy cover may be complete or somewhat open and is dominated by sycamore (*Platanus occidentalis*), cottonwood (*Populus deltoides*), and silver maple (*Acer saccharinum*) with honey locust (*Gleditsia triacanthos*) and hackberry (*Celtis occidentalis*) occasionally present on soils with some calcareous content; box-elder (*Acer negundo*) and Ohio buckeye (*Aesculus glabra*) are characteristic understory associates; the shrub layer is open or dominated by exotic invasive species; common vines include moonseed (*Menispermum canadense*), wild cucumber (*Echinocystis lobata*), riverbank grape (*Vitis riparia*), and Virginia creeper (*Parthenocissus quinquefolia*); characteristic herbaceous species include wingstem (*Verbesina alternifolia*), stinging nettle (*Urtica dioica*), green dragon (*Arisaema dracontium*), ostrich fern (*Matteuccia struthiopteris*), wildrye grasses (*Elymus* spp.), and sedges (*Carex grayi*, *C. intumescens*, *C. amphibola*); exotic invasive species such as Japanese knotweed (*Fallopia japonica*), stiltgrass (*Microstegium vimineum*), dame’s rocket (*Hesperis matronalis*), and moneywort (*Lysimachia nummularia*) are common. [syn: <Floodplain Forest (NY); =Maple-Cottonwood-Sycamore Floodplain Forest (OH); >Sycamore-(River Birch)-Box-elder Floodplain Forest, >Silver Maple Floodplain Forest (PA); ≈CEGL006689, ≈CEGL007334, >CEGL002586 (NS)]
- 3. Wet Floodplain Forest (FRWT).** A wetland community characteristic of groundwater-driven streams, oxbows, and floodplain swamps that have standing water present for extended periods during the growing season; differing from the previous community in the tendency towards more swampy conditions and lower amounts of sycamore (*Platanus occidentalis*) and cottonwood (*Populus deltoides*) in the canopy; wetland oak species (*Quercus bicolor*, *Q. macrocarpa*, *Q. palustris*), shellbark hickory (*Carya laciniosa*), ashes (*Fraxinus pennsylvanica*, *F. nigra*, *F. profunda*), and maples (*Acer rubrum*, *A. saccharinum*, *A. x freemanii*) are typical dominants; the shrub layer is usually open; frequent herbaceous species include woodreed (*Cinna arundinacea*), sedges (*Carex bromoides*, *C. crinita*, *C. lupulina*), wildrye grasses (*Elymus* spp.), sensitive fern (*Onoclea sensibilis*), fringed loosestrife (*Lysimachia ciliata*), and poison ivy (*Toxicodendron radicans*). [syn: <Floodplain Forest, <Silver Maple-Ash Swamp (NY); >Red Maple-Elm-Willow Floodplain Swamp (PA); ≈CEGL002098 **G2G3**, ≈CEGL002018, ≈CEGL002586, CEGL002014 (NS)]

D. Palustrine Forests (FP)

- a. Trees <20% native conifers.....d
a. Trees >20% native conifers; **RARE**b
- b. Conifers >50% tamarack (*Larix laricina*) c
b. Conifers <50% tamarack; >50% hemlock (*Tsuga canadensis*) or white pine (*Pinus strobus*); **RARE**
..... 1. **Conifer-Hardwood Swamp**
- c. Occurring over mineral soils saturated by leaching groundwater; fen indicators (Table 2) present; **VERY RARE**2. **Tamarack Fen**
c. Occurring over organic soils saturated by stagnant groundwater; fen indicators absent; **RARE**
..... 3. **Tamarack Bog**
- d. Trees <20% beech (*Fagus grandifolia*), <20% wet or mesic oaks (*Quercus* spp.; see Table 4), **OR** <20% red/silver maple (*Acer rubrum*, *A. saccharinum*) e
d. Trees >20% beech, >20% wet or mesic oaks, **AND** >20% red/silver maple..... **VI.B.5. Beech-Oak-Maple Forest**
- e. Trees <30% wet or mesic oaks (*Quercus* spp.; see Table 4) f
e. Trees >30% wet or mesic oaks; maples (*Acer* spp.) typically co-dominant **4. Oak-Maple Swamp**
- f. Trees <50% willows (*Salix* spp.) g
f. Trees >50% willows **5. Willow Swamp**
- g. Trees <20% black gum (*Nyssa sylvatica*) and yellow birch (*Betula alleghaniensis*) combined h
g. Trees >20% black gum and yellow birch combined **6. Acid Hardwood Swamp**
- h. Trees >80% wet species (see Table 4), mostly ash (*Fraxinus* spp.), maple (*Acer* spp.), cottonwood (*Populus deltoides*) and/or American elm (*Ulmus americana*) **7. Seral Swamp**
h. Trees <80% wet species; >20% mesic species present **8. Rich Hardwood Swamp**

1. **Conifer-Hardwood Swamp (FPCH)**. Historically present in northeast Ohio but now extremely rare with few sites remaining; found in depressions in glacial topography or in hummocky wetland-upland mosaics on level terrain (Ashtabula Co.); yellow birch (*Betula alleghaniensis*) and red maple (*Acer rubrum*) are typical hardwood associates; the shrub layer is sparse with occasional highbush blueberry (*Vaccinium corymbosum*), winterberry (*Ilex verticillata*), and viburnums (*Viburnum lentago*, *V. dentatum*, *V. recognitum*, *V. alnifolium*); the herbaceous cover may include bunchberry (*Cornus canadensis*), goldthread (*Coptis trifolia*), Canada mayflower (*Maianthemum canadense*), ferns (*Osmunda* spp., *Woodwardia virginica*), and sedges (*C. canescens*, *C. seorsa*, *C. trisperma*); sphagnum moss is usually present . [syn: =Hemlock-Hardwood Swamp (NY); =Hemlock-White Pine-Hardwood Swamp (OH); =Hemlock-Mixed Hardwood Palustrine Forest (PA); =CEGL005003 **G3**, ≈CEGL005044 (NS)]
2. **Tamarack Fen (FPTF)**. Extremely rare, only a few stands are known from calcareous seepages in Geauga and Portage counties; the canopy is relatively open (up to 50%) with tamarack as the sole component or with occasional specimens of red maple (*Acer rubrum*); shrubby cinquefoil (*Dasiphora fruticosa*) and alder-leaf buckthorn (*Rhamnus alnifolia*) are often present in the shrub layer; other shrubs include willows (*Salix* spp., especially *S. candida* and *S. serissima*) and rarely bayberry (*Morella pensylvanica*); the herbaceous cover is distinguished from that of Tamarack Bogs by the inclusion of various calciphilic species; a sphagnum mat is present or absent. [syn: <Red Maple-Tamarack Peat Swamp (NY); =Tamarack Fen (OH); ≈CEGL005232 **G2G3** (NS)]
3. **Tamarack Bog (FPTB)**. Regionally rare, the few remaining stands occurring in peat soils of acid bogs and kettlehole depressions; the canopy is relatively open (up to 50%) with tamarack as the sole component or with

occasional specimens of red maple (*Acer rubrum*), black gum (*Nyssa sylvatica*), or birch (*Betula populifolia*, *B. alleghaniensis*); common shrubs include highbush blueberry (*Vaccinium corymbosum*), catberry (*Nemopanthus mucronatus*), chokeberry (*Aronia melanocarpa*), poison sumac (*Toxicodendron vernix*), and leatherleaf (*Chamaedaphne calyculata*); in open areas, the herbaceous cover may contain cottongrass (*Eriophorum virginicum*), water arum (*Calla palustris*), sedges (*Carex trisperma*, *C. canescens*, *C. stricta*), and carnivorous species (*Drosera* spp., *Sarracenia purpurea*); a sphagnum mat is more or less continuous. [syn: <Red Maple-Tamarack Peat Swamp (NY); =Tamarack-Hardwood Bog (OH); ≈Black Spruce-Tamarack Forest & Woodland (PA); =CEGL002472, ≈CEGL005232 **G2G3** (NS)]

4. **Oak-Maple Swamp (FPOM).** Seasonally wet forests with pooling evident during spring and after heavy rainfall events, eventually becoming dry and droughty by mid-summer; swamp white (*Q. bicolor*), pin (*Q. palustris*), and burr oak (*Q. macrocarpa*) are common along with red (*Acer rubrum*) and/or silver maple (*A. saccharinum*), often as canopy co-dominants or as a pure subcanopy; spicebush (*Lindera benzoin*) is occasional in the shrub layer; herbaceous cover is sparse. [syn: ≈Oak-Maple Swamp (OH); ≈Bottomland Oak-Hardwood Palustrine Forest (PA); >CEGL005037 **G2G3**, >CEGL002432 **G3G4** (NS)]
5. **Willow Swamp (FPWL).** Typically open (up to 50%) communities occurring along groundwater-driven stream/wetland complexes; various willows (*Salix nigra*, *S. fragilis*, *S. alba*, *S. amygdaloides*) are typical canopy components; shrub species include dogwoods (*Cornus amomum*, *C. stolonifera*, *C. racemosa*), viburnums (*Viburnum* spp.), swamp rose (*Rosa palustris*), and shrub willows (*Salix discolor*, *S. sericea*, *S. eriocephala*); herbaceous cover is often dominated by ricecut grass (*Leersia oryzoides*), smartweeds (*Persicaria* spp.), reed canarygrass (*Phalaris arundinacea*), and common reed (*Phragmites australis*). [syn: <Mixed Swamp (OH); ≈Black Willow Scrub/Shrub Wetland (PA); ≈CEGL002103, ≈CEGL003901 (NS)]
6. **Acid Hardwood Swamp (FPAH).** Restricted to acid organic soils, often as a fringe around tall shrub bogs or in low depressions in esker-kame glacial topography; sometimes found as a relict community in drained bog sites; although this community is defined by the inclusion of significant amounts of black gum (*Nyssa sylvatica*) and/or yellow birch (*Betula alleghaniensis*), red maple (*Acer rubrum*) is frequently the dominant canopy species; highbush blueberry (*Vaccinium corymbosum*) and winterberry (*Ilex verticillata*) are common shrub species; sphagnum moss is usually present in mats or on hummocks with ferns (*Osmunda cinnamomea*, *O. regalis*), Canada mayflower (*Maianthemum canadense*), swamp dewberry (*Rubus hispidus*), and sedges (*C. bromoides*, *C. lacustris*, *C. atlantica*). [syn: <Red Maple-Hardwood Swamp (NY); <Mixed Swamp (OH); =Red Maple-Black Gum Palustrine Forest (PA); ≈CEGL006014 **G3** (NS)]
7. **Seral Swamp (FPSE).** With the decline of elm and ash trees due to disease and insect pests, this community is often weedy and seral in appearance with many standing dead trees and a thinning canopy; a common forest of low, flat areas, frequently grading into emergent marshes, hawthorn thickets, or impenetrable shrub swamps; black gum (*Nyssa sylvatica*), aspens (*Populus* spp.), and pin oak (*Quercus palustris*) are occasional associates; the shrub layer frequently includes arrowwood (*Viburnum dentatum*, *V. recognitum*) and dogwoods (*Cornus racemosa*, *C. amomum*); glossy buckthorn (*Frangula alnus*) is often dominant in disturbed areas; frequent herbaceous associates include fowl mannagrass (*Glyceria striata*), wrinkleleaf goldenrod (*Solidago rugosa*), jewelweed (*Impatiens capensis*), rough bluegrass (*Poa trivialis*), and poison ivy (*Toxicodendron radicans*). [syn: ≈Red Maple-Hardwood Swamp; >Silver Maple-Ash Swamp (NY); =Maple-Ash Swamp (OH); >Red Maple-Black Ash Palustrine Forest, >Great Lakes Region Lakeplain Palustrine Forest (PA); =CEGL005038, ≈CEGL002014, >CEGL007441, >CEGL006689 (NS)]
8. **Rich Hardwood Swamp (FPRC).** Closely resembling Rich Hardwood Forest (VI.B.10) types in canopy composition and not always easily distinguished based on species composition alone, the primary difference being the presence of hydric soils and wetland hydrology; mesic species such as hickory, (*Carya* spp.), basswood (*Tilia americana*), red and white oak (*Quercus rubra*, *Q. alba*), tuliptree (*Liriodendron tulipifera*), and black cherry (*Prunus serotina*) may be present or co-dominant along with typical hydrophytic species; shrub and herbaceous species are a diverse mix of wetland and mesic-upland species. [syn: =Mixed Swamp (OH)]

-
- ¹ see Environmental Laboratory's 1987 *Corps of Engineers Wetlands Delineation Manual* (<http://el.erdc.usace.army.mil/elpubs/pdf/wlman87.pdf>) and 2012 *Regional Supplement to the Corps of Engineers Delineation Manual: Northcentral and Northeast Region* (<http://el.erdc.usace.army.mil/elpubs/pdf/trel12-1.pdf>)
- ² having wetland indicator of OBL, FACW, or FAC, as defined by the current National Wetland Plant List (<http://rsgisias.crrel.usace.army.mil/NWPL/>) for Northcentral and Northeast Region
- ³ See United States Department of Agriculture, Natural Resource Conservation Service's 2010 *Field Indicators of Hydric Soils in the United States* (http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_053171.pdf)
- ⁴ Edinger *et al*'s 2002 *DRAFT Ecological Communities of New York State* (<http://www.dec.ny.gov/animals/29392.html>)
- ⁵ Dennis M. Anderson's 1982 *Plant Communities of Ohio: A Preliminary Classification and Description* (https://www.dot.state.oh.us/Divisions/Planning/Environment/Ecological_Resources_Permits/Ecology/Documents/PlantCommunities.pdf)
- ⁶ Zimmerman *et al*'s 2012 *Terrestrial and Palustrine Plant Communities of Pennsylvania, 2nd Edition* (<http://www.naturalheritage.state.pa.us/Communities.aspx>)
- ⁷ from NatureServe Explorer (<http://explorer.natureserve.org/index.htm>)
- ⁸ adapted from table provided in John Mack's 2001 *Ohio Rapid Assessment Method for Wetlands v.5.0, Users Manual and Scoring Forms* (http://www.epa.state.oh.us/portals/35/401/oram50um_s.pdf)
- ⁹ see current National Wetland Plant List (<http://rsgisias.crrel.usace.army.mil/NWPL/>) for Northcentral and Northeast Region