Palustrine Plant Community Key for Pennsylvania

A resource for classifying wetland communities of Pennsylvania, USA

Pennsylvania Natural Heritage Program
Western Pennsylvania Conservancy

Wetland Plant Community Key for Pennsylvania

(scientific names for plants follow Rhoads and Block 2007;
plant community names follow Zimmerman et. al 2012)

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The Natural Heritage Program (PNHP) developed a guidance tool to aid the Pennsylvania Department of Environmental Protection (DEP) to incorporate state rarity rankings for wetland plant community types for more effective wetland regulation and management. PNHP facilitated incorporation of rare plant community information through: 1) the development and testing of a field key for the efficient and accurate identification of Pennsylvania wetland plant communities, and 2) the development of concise standardized fact sheets for each wetland plant community, presented on-line, to augment and support the application of the field key. The fact sheets detail the environmental drivers, stresses, threats, and best management practices. Fact sheets are available to DEP staff, to the watershed community and the public through the PNHP website (http://www.naturalheritage.state.pa.us/Communities.aspx).

As a result of this project, 77 total wetland plant communities were identified and reflect the most current statewide wetland plant community classification. Of these, 16 state endangered communities (S1-status), 6 state threatened communities (S2-status), 14 state rare communities (S3-status), 29 state uncommon communities (S4-status), 11 common communities (S5-status), and 1 non-ranked community (SNR) were identified. The tools developed through this project support DEP's effort to incorporate wetland plant community rarity information into its wetland permitting program and in providing more effective guidelines for management and regulation of wetlands and their associated watersheds.

Cover photographs provided by David Goerman

PLEASE READ BEFORE USING THIS PALUSTRINE WETLAND COMMUNITY CLASSIFICATION SYSTEM:

VEGETATION KEY

The wetland plant community key was created by the Pennsylvania Natural Heritage Program to aid in delineation of wetland plant community types within Pennsylvania. Wetland plant community types were revised in 2012 (Zimmerman et al. 2012), and detailed descriptions, along with classification, distribution, conservation information, and "crosswalks" to the National Vegetation Classification (USNVC) can be found on-line (http://www.naturalheritage.state.pa.us/Communities.aspx). Ecological communities are defined as a group of plant, animal, fungal, and microbial populations within a common environment that interact with each other and the physical environment (Whitaker 1975). More specifically, we can describe the specific plant populations within an ecological community by using the concept of a plant community. While distinct occurrences of plant communities may differ in composition due to individual species responses to complex biotic and abiotic interactions (Gleason 1926), certain species commonly occur together which allow the plant populations to be classified within a plant community concept. As a result, definitive plant communities tend to occur within specific environmental settings and are therefore repeatable across a landscape and useful as a classification tool. The key uses dominant and indicator plant species as well as soil characteristics, hydrology, geology, and other environmental conditions to help guide the users into classifying wetland vegetation into specific wetland plant communities. However, this process is only an artificial way to classify a complex system. It is important to note that distinct occurrences of the same plant community will have slight differences in their species composition but tend to have general similarities which allow the plant populations to be classified within a plant community concept. Therefore, two distinct plant communities will share common species and structure but may vary in appearance.

The qualifiers in the key are largely based on the plant species with the highest vegetation cover to ease in classification and delineation of plant communities in the field. Additionally, the initial structure of the vegetation key is based on semi-physiognomic categories defined below:

- Seep Group - Plant communities that occur in areas where groundwater surfaces to either create a localized pool of water (seep) or channel of flowing water (spring). These communities tend to be small and only vegetation growing within the seep or spring should be used for classification. These are often small patch wetland communities that are often embedded in other types, often terrestrial forests.

- Sparse Vegetation Group - Vegetation covers less than 25% of total area with non-vegetated areas consisting of sand, cobbles, or bare rock.

- Herbaceous Group - Plant communities are dominated by herbaceous or graminoid species and vegetation cover is greater than 25%. Woody species (shrubs and trees) cover is less than 25% of total area.

- Shrubland Group - Plant communities with shrub (woody species 5 meters tall or less) cover greater than 25% of area. Tree (woody species greater than 5 meters tall) cover is less than 25% of area.

- Woodland Group - Plant communities with tree (woody species greater than 5 meters tall) cover between 25% - 60% of area.

- Forest Group - Plant communities with tree (woody species greater than 5 meters tall) cover greater than 60% of area.

The simplified structure of the key is designed to be used by several levels of users. However, it is strongly suggested that fact sheets be referenced before a plant community is officially delineated in order to verify the vegetation is accurately classified. Furthermore, it is important to note the following caveats before using the following vegetation key:

1) The names of plant communities within the key are typically named based on the plant species that tend to have the greatest cover, or dominance, within the community. Generally, the most dominant species are listed first with co-dominant species listed after a dash "– " (i.e. Red Spruce – Mixed Hardwood Palustrine Woodland, Leatherleaf – Bog-rosemary Wetland, Big Bluestem - Indian-grass Floodplain Grassland). Other plant communities are given a common name that summarizes the position on the landscape they occupy (i.e. Floodplain Meadow, Floodplain Scour Community). While the plant community names and indicator species used in the statewide classification and vegetation key are designed to create a general name for a specific group of vegetation, the plant community names are not all-inclusive of the species found within the community. Please read the classifiers within the key carefully when delineating vegetation and reference the fact sheets and abstracts to ensure the most representative plant community type is chosen.

2) A single wetland can typically be categorized into several types of wetland plant communities. Large upland depression wetlands can typically have a forest, shrubland, and several herbaceous plant community types. The most efficient way to use this key is to locate an area of similar vegetation and attempt to key the vegetation into a plant community.

3) It is important to get a sense of the distinct zonation of vegetation in order to use the key efficiently. Some plant communities can occur in distinct bands adjacent to other communities with some overlap of taller vegetation, such as shrub and tree species. An example of this may be a band of an herbaceous plant

community adjacent to a forested community with trees that overhang above the herbaceous community (Figure 1). In the example outlined in Figure 2, the herbaceous species composition differs between the two communities and there is a distinct zonation pattern that indicates differences in vegetation between the two community types. Therefore, both types of vegetation are considered separately for classification and the canopy above the herbaceous community should be ignored while using the key to classify the herbaceous community. If the herbaceous community occurred solely under the canopy of the trees and did not demonstrate a distinct zonation pattern, then the community would be classified as a forested community.

4) Ecotones, or transition zones between two distinct adjacent plant community types that have a blend of species composition and environmental characteristics of both community types, may occasionally occur and can be difficult to key. In such cases, we recommend either using the key to best categorize the vegetation into a single plant community type or assign the vegetation a name that characterizes both plant community types (i.e. Buttonbush Wetland / Water-willow (*Decodon verticillatus*) Shrub Wetland).

Photo: Pennsylvania Natural Heritage Program

Figure 1. Two separate wetland communities (forested community on left and herbaceous community on right) with overhanging vegetation at the transition zone.

5) Plant communities are in a constant state of change and are subject to plant succession and disturbance regimes. In this sense, it is important to note that a plant community may succeed to another plant community type over time. For example, a river floodplain may exhibit a zonation of successional plant

communities (herbaceous, shrubland, forest) and flooding events may alter the boundaries of the plant community types and potentially reset certain communities to earlier successional types (Figure 2). In conclusion, boundaries and occurrences of some plant communities can be dynamic and it is important to resurvey plant communities to verify their existence every 5 to 10 years.

6) Invasive plant species found within a community may affect the ability to use the key efficiently. There are specific plant communities identified in the key that are complete monotypic stands of invasive species (i.e. Japanese Knotweed Floodplain Thicket, Common Reed Marsh, Reed Canary-grass Floodplain Grassland). However, many wetland plant community types are subject to invasion by exotic plant species and such vegetation may represent varying levels of degradation of a native plant community type. It is important to note invasive species within a plant community when using this key and be aware that a community may be slightly degraded and still be considered of conservation importance and in need of restoration, rather than simply classifying the vegetation as one of the monotypic invasive plant community types. To assist in this process, common invasive species are listed in the fact sheets for each plant community type.

Photo: Pennsylvania Natural Heritage Program

Figure 2. Wetland plant communities along the floodplain of Broadhead Creek, in Pennsylvania.

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Group Classification

1 Areas where groundwater discharges to the surface to either create a localized pool of water (seep) or channel of flowing water (spring). These communities tend to be small and only vegetation growing within the seep or spring should be used for classification.

SEEP GROUP (SG) (Page 7)

1 Areas where groundwater does not discharge to the surface to create a localized pool of water (seep) or channel of flowing water (spring).

2 Vegetation covers less than 25% of total area with non-vegetated areas consisting of sand, cobbles, or bare rock. These areas are often along riparian shorelines.

SPARSE VEGETATION GROUP (SVG) (Page 8)

2 Vegetation covers 25% or more of total area.

3 Community is dominated by herbaceous or graminoid species. Woody species (shrubs and trees) cover is less than 25% of total area. This group contains types considered "persistent" and "non-persistent" wetlands, as classified by Fike (1999).

HERBACEOUS GROUP (HG) (Page 9)

3 Woody species (shrubs and trees) cover is greater than 25%.

4 Shrubs (woody species 5 meters tall or less) cover greater than 25% of area. Trees (woody species greater than 5 meters tall) cover less than 25% of area.

SHRUBLAND GROUP (SLG) (Page 18)

4 Trees (woody species greater than 5 meters tall) cover greater than 25% of area.

5 Trees (woody species greater than 5 meters tall) cover 25% - 60% of area.

WOODLAND GROUP (WLG) (Page 23)

5 Trees (woody species greater than 5 meters tall) cover greater than 60% of area.

FOREST GROUP (FG) (Page 25)

SEEP GROUP (SG)

1 Community occurs along bluffs or steep slopes either adjacent to streams or to Lake Erie, in northwestern Pennsylvania. The community may be dominated by shrubs or herbaceous species.

2 Community occurs along the bluffs of Lake Erie. Shrub species including red-osier dogwood (*Cornus sericea*), alder (*Alnus* spp.), and willows (*Salix* spp.) often (but not always) provide a substantial component of the community.

Great Lakes Bluff Seep

2 Community occurs along the steep gorge bluffs along tributaries to Lake Erie. Relative cover of vegetation is dominated by forbs and grasses.

River Bluff Seep

1 Community occurs in variety of settings but not typically along bluffs or steep slopes either adjacent to streams or to Lake Erie in northwestern Pennsylvania. Relative herbaceous cover typically contains golden saxifrage (*Chrysosplenium americanum*).

3 Groundwater forms a distinct channel. Relative herbaceous cover is dominated by golden saxifrage (*Chrysosplenium americanum*), Pennsylvania bittercress (*Cardamine pensylvanica*), and watercress (*Nasturtium officinale*). Horsetails (*Equisetum* spp.) may also be present.

Golden Saxifrage – Pennsylvania Bittercress Spring Run

3 Groundwater has a diffuse flow, resulting in a broad area of muck soils or small ponds where the groundwater emerges.

4 Community occurs in seeps underlain by serpentine bedrock. Relative cover for herbaceous layer is dominated by some combination of the following: tufted hairgrass (*Deschampsia cespitosa*), rice cutgrass (*Leersia oryzoides*), New York ironweed (*Vernonia noveboracensis*), slender spike-rush (*Eleocharis tenuis*), and deer-tongue grass (*Dichanthelium clandestinum*) are common.

Serpentine Seepage Wetland

4 Community does not occur in seeps underlain by serpentine bedrock. Skunk cabbage (*Symplocarpus foetidus*) is typically present from April to late-May. These are often small patch wetland communities that are embedded in other types, often closed-canopy terrestrial forests.

5 Relative herbaceous cover is dominated by sedges (*Carex* spp.), Pennsylvania bittercress (Cardamine pensylvanica), golden saxifrage (*Chrysosplenium americanum*), golden ragwort (*Packera aurea*), and skunk cabbage (*Symplocarpus foetidus*).

Golden Saxifrage – Sedge Rich Seep

5 Relative herbaceous cover is dominated by skunk cabbage (*Symplocarpus foetidus*), golden saxifrage (*Chrysosplenium americanum*), and cinnamon fern (*Osmunda cinnamomea*).

Skunk-cabbage - Golden Saxifrage Seep

SPARSE VEGETATION GROUP (SVG)

1 Community occurs along river and stream shores/bars or along lakeshores. Substrate is composed of cobbles, sand, or gravel.

2 Community occurs along the floodplains of rivers where ice or flooding have scoured the vegetation.

3 Substrate is predominantly exposed bedrock or large boulders with plants growing in soil that accumulates within bedrock cracks. Shrubs are scattered and may include willows (*Salix* spp.), sevenbark (*Hydrangea arborescens*), smooth azalea (*Rhododendron arborescens*), swamp azalea (*Rhododendron viscosum*), rosebay (*Rhododendron maximum*), buttonbush (*Cephalanthus occidentalis*), and swamp rose (*Rosa palustris*). Trees, such as sycamore (*Platanus occidentalis*), silver maple (*Acer saccharinum*), may be present as young saplings or as battered, stunted individuals of variable age. Common herbaceous species include Indian-grass (*Sorghastrum nutans*), big bluestem (*Andropogon gerardii*), freshwater cordgrass (*Spartina pectinata*), Indian-hemp (*Apocynum cannabinum*), and/or royal fern (*Osmunda regalis*).

Floodplain Scour Community

3 Substrate is variable, primarily sand, gravel, or cobble of river and stream shores/bars or along lakeshores. Some trees and shrubs such as sycamore (*Platanus occidentalis*), silver maple (*Acer saccharinum*), willows (*Salix* spp.), and alders (*Alnus* spp.) may be present as young saplings or as battered, stunted individuals of variable age. Herbaceous layer is typically dominated by smartweeds (*Persicaria* spp.), umbrella sedges (*Cyperus* spp.), blue vervain (*Verbena hastata*), purple loosestrife (*Lythrum salicaria*), common cocklebur (*Xanthium strumarium*), and other common annuals and short lived perennial plant species.

Periodically Exposed Shoreline

2 Community occurs only along the shoreline of Lake Erie.

4 Community occurs on the unvegetated cobble and gravel shores of Lake Erie. The vegetation is sparse (usually less than 25% total cover). The community may include American beachgrass (*Ammophila breviligulata*), sea-rocket (*Cakile edentula*), beach pea (*Lathyrus japonicus*), and silverweed (*Potentilla anserina*).

Great Lakes Sparsely Vegetated Shore

4 Community occurs typically along saturated sandy flats, primarily on Presque Isle, in Erie County but may be found in small patches along the entire Lake Erie Coast of Pennsylvania. Relative cover for herbaceous layer is variable, and is mostly dominated by rushes (*Juncus* spp.*)* and umbrella sedges (*Cyperus* spp,).

Great Lakes Palustrine Sandplain

1 Community occurs in small upland depressions beneath a canopy of overstory trees rooted in the surrounding upland area. Substrate can be leaf litter, muck, or bare soil and is often saturated. There is usually standing water present during the growing season.

Sparsely Vegetated Vernal Pool Community

HERBACEOUS GROUP (HG)

1 Community is dominated by graminoid species (grasses, sedge, rushes). Herbs may be present but graminoid species represent a higher vegetative cover.

2 Community is dominated by bulrush species (*Schoenoplectus* spp.) in near monotypic clones: great bulrush (*Schoenoplectus tabernaemontani*), and/or hardstem bulrush (*Schoenoplectus acutus*), or less commonly by chairmaker's rush (*Schoenoplectus pungens*), a bulrush (*Schoenoplectus purshianus*), river bulrush (*Schoenoplectus fluviatilis*), or Torrey's bulrush (*Schoenoplectus torreyi*)

Bulrush Marsh

2 Community is dominated by graminoid species other than bulrush species, primarily grasses (*Poaceae*) and/or sedges (*Cyperaceae*).

3 Community occurs on river floodplains.

4 Relative cover for herbaceous layer is dominated by one of the following: canary-grass (*Phalaris arundinacea*), Canada bluejoint (*Calamagrostis canadensis*), big bluestem (*Andropogon gerardii*), Indian-grass (*Sorghastrum nutans*), or common reed (*Phragmites australis* ssp. *australis*).

5 Relative cover for herbaceous layer is dominated by reed canary-grass (*Phalaris arundinacea*) and/or Canada bluejoint (*Calamagrostis canadensis*).

6 Almost a monotypic stand of reed canary-grass (*Phalaris arundinacea*), may contain some other herb or grass species but clearly dominated by reed canary grass. Community typically occurs along floodplains.

Reed Canary-grass Floodplain Grassland

6 Dominated by a combination of reed canary-grass (*Phalaris arundinacea*) and Canada bluejoint (*Calamagrostis canadensis*). Community occurs in marshes within river backwaters or upland depressions.

Bluejoint – Reed Canary-grass Marsh

5 Relative cover for herbaceous layer is dominated by big bluestem (*Andropogon gerardii*), Indian-grass (*Sorghastrum nutans*), or common reed (*Phragmites australis* ssp. *australis*).

7 Relative cover for herbaceous layer is dominated by a combination of big bluestem (*Andropogon gerardii*), Indian-grass (*Sorghastrum nutans*) and/or switchgrass (*Panicum virgatum*). Community typically occurs along the scour zone of floodplains or islands.

Big Bluestem - Indian-grass Floodplain Grassland

7 Herbaceous layer is almost a monotypic stand of common reed (*Phragmites australis* ssp. *australis*). Other herb or grass species may be present but the community is clearly dominated by common reed. Community occurs in various settings.

Common Reed Marsh

4 Relative cover for herbaceous layer is dominated by hairy-fruited sedge (*Carex trichocarpa*) or twisted sedge (*Carex torta*).

8 Almost a monotypic stand of hairy-fruited sedge (Carex trichocarpa), may contain some other herb or grass species but hairy-fruited sedge clearly dominates the herbaceous layer. Community occurs along floodplains of large rivers.

Hairy-fruited Sedge (*Carex trichocarpa*) Floodplain Wetland

8 Relative cover for herbaceous layer is dominated by twisted sedge (*Carex torta*). Community is usually found along the banks of smaller tributaries.

Twisted Sedge (*Carex torta*) Stream Margin

3 Community occurs in headwater basins, upland depressions or seeps.

9 Vegetation rooted in a substrate consisting of either mineral soil or a thin layer of organic material (muck) over mineral soil.

10 Relative cover for herbaceous layer is greater than 75% for sedges (*Carex* spp.).

11 Relative cover for herbaceous layer is dominated by tussock sedge (*Carex stricta*). Other species may be present but tussock sedge is the clear dominate herbaceous species.

Tussock Sedge Marsh

11 Relative cover for herbaceous layer is dominated by a combination of several sedges such as bog sedge (*Carex sterilis*), prairie sedge (*Carex prairea*), a sedge (*Carex lacustris*), or yellow sedge (*Carex flava*). Tussock sedge (*Carex stricta*) may be present but community is not a monotypic layer of tussock sedge. Calciphilic species such as grass of grass-of-Parnassus (*Parnassia glauca*) may be present.

Sedge - Mixed Forb Fen

10 Relative cover for herbaceous layer is dominated by both grasses and sedges (*Carex* spp.). Sedge cover is less than 75%.

12 Community occurs on seeps underlain by serpentine bedrock. Relative cover for herbaceous layer is dominated by some combination of the following: tufted hairgrass (*Deschampsia cespitosa*), rice cutgrass (*Leersia oryzoides*), New York ironweed (*Vernonia noveboracensis*), slender spike-rush (*Eleocharis tenuis*), and deer-tongue grass (*Dichanthelium clandestinum*).

Serpentine Seepage Wetland

13 Relative cover for herbaceous layer is dominated by reed canary-grass (*Phalaris arundinacea*), Canada bluejoint (*Calamagrostis canadensis*), or common reed (*Phragmites australis*).

14 Relative cover for herbaceous layer is dominated by reed canary-grass (*Phalaris arundinacea*) and/or Canada bluejoint (*Calamagrostis canadensis*). Community occurs in marshes within river backwaters or upland depressions.

Bluejoint – Reed Canary-grass Marsh

14 Herbaceous layer is almost a monotypic stand of common reed (*Phragmites australis*). Other herb or grass species may be present but the community is clearly dominated by common reed.

Common Reed Marsh

13 Relative cover for herbaceous layer is <u>not</u> dominated by reed canary-grass (*Phalaris arundinacea*), Canada bluejoint (*Calamagrostis canadensis*), or common reed (*Phragmites australis*).

15 Community is located in small upland depressions that are seasonally inundated; shrubs may or may not be present. The margin of the wetland's basin may or may not be distinguishable.

16 The community is composed of herbaceous species only; composition is variable. Relative cover is composed of the following: rice cutgrass (*Leersia oryzoides*), mannagrass (*Glyceria* spp.), three-way sedge (*Dulichium arundinaceum* var. *arundinaceum*), sedges (*Carex* spp.), or bulrushes (*Scirpus* spp.). Other common species include bugleweed (*Lycopus uniflorus*), smartweeds (*Persicaria* spp.), marsh fern (*Thelypteris palustris*), Joe-Pye-weed (*Eutrochium* spp.), cinnamon fern (*Osmunda cinnamomea),* and royal fern (*Osmunda regalis*).

Rice Cutgrass – Bulrush Vernal Pool

16 Community is dominated by a combination of herbaceous and shrubby plant species; wool-grass (*Scirpus cyperinus*) is usually dominant. Associate species include floating mannagrass (*Glyceria septentrionalis*), rattlesnake mannagrass (*Glyceria canadensis*), rice cutgrass (*Leersia oryzoides*), pale meadowgrass (*Torreyochloa pallida*), sedges (e.g. *Carex crinita, C. lurida, C. lupulina, C. vesicaria, C. folliculata*), three-way sedge (*Dulichium arundinaceum*), mild water-pepper (*Persicaria hydropiperoides*), marsh-purslane (*Ludwigia palustris*), marsh St. Johns-wort (*Triadenum fraseri*). Shrubs include hardhack (*Spiraea tomentosa*), meadow-sweet (*S. alba*), northern arrow-wood (*Viburnum recognitum*), highbush blueberry (*Vaccinium corymbosum*), and buttonbush (*Cephalanthus occidentalis*).

Wool-grass – Mannagrass Mixed Shrub Vernal Pool

15 Community is <u>not</u> located in a small, isolated upland depression that is seasonally inundated, but rather community occurs in what can be described as a moist field, ditch, or low-lying area; shrubs may or may not be present. Relative cover for herbaceous layer is dominated by a combination of sedges, grasses and forbs. Sedge species present are usually common in Pennsylvania.

Mixed Forb - Graminoid Wet Meadow

9 Community composed of vegetation rooted in a substrate consisting of moss or sedge peat.

17 Community is dominated by one or a combination of the following: tussock sedge (*Carex stricta*), prairie sedge (*Carex prairea*), many-fruited sedge (*Carex lasiocarpa*), or a sedge (*Carex lacustris*). Other species will be present but the clear dominant species are the sedges above.

18 Community is dominated by tussock sedge (*Carex stricta*) often in near monotypic stands. Community typically consists of well-developed sedge tussocks interspersed with standing water over organic muck soils.

Tussock Sedge Marsh

18 Community composition is variable, often dominated by sedges such as Atlantic sedge (*Carex sterilis*), prairie sedge (*Carex prairea*), a sedge (*Carex lacustris*), and yellow sedge (*Carex flava*), or cotton-grass (*Eriophorum virginicum*) and/or white beak-rush (*Rhynchospora alba*). Tussock sedge (*Carex stricta*) may be present but community is <u>not</u> a monotypic layer of tussock sedge.

19 Plant community is dominated by calciphilic sedge species such as Atlantic sedge (*Carex sterilis*), sedge (*Carex tetanica*), and yellow sedge (*Carex flava*). Substrate consists of sedge or sphagnum peat. Other calcareous indicators including grass of grass-of-Parnassus (*Parnassia glauca*) and mountain-mint (*Pycnanthemum virginianum*) may be present. Community is influenced by calcium-rich groundwater. Surface water pH is between 6.0 and 7.9 during the growing season.

Sedge - Mixed Forb Fen

19 Plant community is <u>not</u> dominated by calciphilic sedge species; relative cover of sedge species is variable. Community may or may not be influenced by groundwater. Surface water pH is between 3.5 and 5.5 during the growing season. Typically, peat moss (*Sphagnum* spp.) is abundant, often forming a dense mat beneath the vascular flora.

20 Community is dominated by many-fruited sedge (*Carex lasiocarpa*). Flat-leaved bladderwort (*Utricularia intermedia*) is also a characteristic species. Other associated species may include a sedge (Carex lacustris), marsh cinquefoil (Potentilla palustris), tussock sedge (Carex stricta), and marsh fern (Thelypteris palustris). Substrate consists of a deep layer of decomposed sedge-peat.

Many-Fruited Sedge - Bladderwort Poor Fen

20 Community is dominated by tawny cotton-grass (*Eriophorum virginicum*) and/or white beak-rush (*Rhynchospora alba*). Pitcher-plant (*Sarracenia purpurea*) or sundew (*Drosera* spp.) are typically present.

21 Community is dominated by white beak-rush (*Rhynchospora alba*) and peat mosses (*Sphagnum* spp.). Acid-indicators are usually present including round-leaved sundew (*Drosera rotundifolia*), spatulate-leaved sundew (*Drosera intermedia*), and pitcher-plant (*Sarracenia purpurea*). Cotton-grass (*Eriophorum vaginatum*), and tawny cotton-grass (*Eriophorum virginicum*) are typically present but at lower coverage. Cranberry (*Vaccinium macrocarpon*) and small cranberry (*Vaccinium oxycoccos*) are abundant in some areas. The pH of the surface water is low (3.5-4.0) and there is little groundwater influence. Community typically associated with a floating mat.

Sphagnum – Beak-Rush Peatland

21 Plant species can be variable, but is usually dominated by tawny cotton-grass (*Eriophorum virginicum*), white beak-rush (*Rhynchospora alba*), a sedge (*Carex trisperma*), and a sedge (*Carex folliculata*). Other species include soft rush (*Juncus effusus*), narrow-panicled rush (*Juncus brevicaudatus*), cinnamon fern (*Osmunda cinnamomea*), round-leaved sundew (*Drosera rotundifolia*), and wool-grass (*Scirpus cyperinus*). The pH of the surface water is low (4.0 – 5.0); however, the community is often influenced by groundwater. Community is seldom part of a floating mat. Community patch may include remnant tree stumps and other evidence of historic logging.

Cotton-grass Poor Fen

1 Community is dominated by forbs. Graminoid species may be present but forbs represent a higher vegetative cover.

22 Communities of river floodplains and tidal marshes; vegetation composition variable.

23 Vegetation is rooted in substrates that are periodically flooded and may remain saturated, but is above the mean water level.

24 Vegetation is a monotypic stand of Japanese knotweed (*Fallopia japonica*).

Japanese Knotweed Floodplain Thicket

24 Vegetation is <u>not</u> a monotypic stand of Japanese knotweed (*Fallopia japonica*).

25 Vegetation is variable; community occurs along lower floodplain terraces experiencing periodic flooding; may grade into other floodplain communities. Type may represent openings in floodplain forests, dominated by herbaceous species. The relative cover for herbaceous layer may be dominated by goldenrods (*Solidago* spp.) and wingstem (*Verbesina alternifolia*). Characteristic species include species associated with river floodplain ecosystems: reed canary-grass (*Phalaris arundinacea*), common sneezeweed (*Helenium autumnale*), twisted sedge (*Carex torta*), cardinal-flower (*Lobelia cardinalis*), smartweeds (*Persicaria* spp.), blue vervain (*Verbena hastata*), bulrush (*Scirpus polyphyllus*), and big bluestem (*Andropogon gerardii*).

Floodplain Meadow

25 Vegetation is variable; community occurs along higher floodplain terraces that are flooded only in the most extreme flood events; may grade into upland forest and shrubland communities. Relative cover for herbaceous layer is dominated by a combination of sedges, grasses and forbs common in Pennsylvania.

Mixed Forb - Graminoid Wet Meadow

23 Vegetation is rooted in substrates that are nearly permanently flooded or saturated throughout the growing season; standing or flowing water is present except during annual periods of low flow, tidal fluctuation, or where water has been artificially drawn down.

26 Community occurs along freshwater intertidal zone of the Coastal Plain.

27 Occurs on gradually sloping river banks in the zone between low tide and mean high tide. Vegetation is typically separated into three zones. The uppermost zone includes wild-rice (*Zizania aquatica*), salt-marsh water-hemp (*Amaranthus cannabinus*), swamp beggar-ticks (*Bidens bidentoides*), showy bur-marigold (*Bidens laevis*), pickerel-weed (*Pontederia cordata*), arrow-arum (*Peltandra virginica*), and dotted smartweed (*Persicaria punctata*). The middle zone is dominated by chairmaker's rush (*Schoenoplectus pungens*), spatter-dock (*Nuphar advena* and *N. variegata*), long-lobed arrowhead (*Sagittaria calycina*), arrowhead (*Sagittaria rigida*), mud-plantain (*Heteranthera multiflora*), and Smith's bulrush (*Schoenoplectus smithii*). The lowest vegetated zone is an exposed mudflat at low tide; subulate arrowhead (*Sagittaria subulata*) is often present along with true aquatic species.

Riverbank Freshwater Tidal Marsh

27 Occurs on areas of low-lying, nearly level land adjacent to the upper edge of the sloping river bank. No clear zonation of vegetation. Relative cover for herbaceous layer is dominated by wild-rice (*Zizania aquatica*), swamp beggar's-ticks (*Bidens bidentoides*), showy bur-marigold (*Bidens laevis*), and salt-marsh water-hemp (*Amaranthus cannabinus*). Numerous, more widespread wetland plants may also be present such as sweet flag (*Acorus calamus*), common cat-tail (*Typha latifolia*), arrow-arum (*Peltandra virginica*), pickerelweed (*Pontederia cordata*), wapato (*Sagittaria latifolia*), dotted smartweed (*Persicaria punctata*), halberd-leaf tearthumb (*Persicaria arifolia*), marsh-purslane (*Ludwigia palustris*), rice cutgrass (*Leersia oryzoides*), jewelweed (*Impatiens capensis*), sensitive fern (*Onoclea sensibilis*), rose-mallow (*Hibiscus moscheutos*), and climbing hempweed (*Mikania scandens*).

Freshwater Tidal Mixed High Marsh

26 Community does <u>not</u> occur along intertidal zone of the Coastal Plain.

28 Community is composed of non-persistent emergent vegetation that occurs in inundated depressions along lakeshores or riparian zones, usually in sloughs. The appearance of these systems changes seasonally from nearly unvegetated substrate in winter and early spring, to dense vegetation during the height of the growing season. Substrate is muck and usually flooded throughout the growing season. Relative cover for herbaceous layer is dominated by spatterdock (*Nuphar advena* and *N. variegata*) and fragrant water-lily (*Nymphaea odorata*), or pickerel-weed (*Pontederia cordata*), arrow-arum (*Peltandra virginica*), wapato (*Sagittaria latifolia* var. *latifolia*).

29 Relative cover for herbaceous layer is dominated by spatterdock (*Nuphar advena* and *N. variegata*) and fragrant water-lily (*Nymphaea odorata*). Water smartweed (*Persicaria amphibia*), rice cutgrass (*Leersia oryzoides), arrow-arum (Peltandra virginica), and wapato (Sagittaria latifolia) are typically present at lower cover.*

Spatterdock - Water-lily Emergent Wetland

29 Relative cover for herbaceous layer is dominated by pickerel-weed (*Pontederia cordata*), arrow-arum (*Peltandra virginica*), and wapato (*Sagittaria latifolia*).

Pickerel-weed - Arrow-arum - Arrowhead Emergent Wetland

28 Community is composed of persistent emergent vegetation that occurs in inundated depressions along lakeshores or riparian zones (often in sloughs) or on gravel and cobble bars within the stream channel. Relative cover for herbaceous layer is dominated by either near monotypic stands of cat-tails (*Typha* spp.), water-willow (*Justicia americana*) or lizard's-tail (*Saururus cernuus*) or is composed of a wide variety of persistent emergent plant species.

30 Community is dominated by either water-willow (*Justicia americana*) or lizard's-tail (*Saururus cernuus*).

31 Community is is dominated by water-willow (*Justicia americana*). Substrate is gravel or cobbles and is often flooded by flowing water.

Water-willow (*Justicia americana*) Emergent Bed

31 Community is dominated by lizard's-tail (*Saururus cernuus*). Substrate is sand or silt and is often flooded.

Lizard's-tail Emergent Bed

30 Vegetation composition of community is variable, either dominated by cat-tail species (*Typha* spp.) or a wide variety of persistent emergent plant species. Plants rooted in flooded substrate, usually by standing or ponded water.

32 Herbaceous cover is almost a monotypic stand of cat-tail species (*Typha* spp.).

Cattail Marsh

32 Relative cover for herbaceous layer is variable; characteristic species include three-way sedge (*Dulichium arundinaceum* var. *arundinaceum*), halberd-leaved tearthumb (*Persicaria arifolia*), tearthumb (*Persicaria sagittata*), rushes (*Juncus* spp.), beggar-ticks (*Bidens* sp.), and sensitive fern (*Onoclea sensibilis)*.

Mixed Forb Marsh

22 Communities of basin wetlands and upland depressions; vegetation composition variable.

33 Vegetation composition of community is variable, either dominated by cat-tail species (*Typha* spp.) or a wide variety of persistent emergent plant species. Plants rooted in flooded substrate, usually by standing or ponded water.

34 Herbaceous cover is almost a monotypic stand of cat-tail species (*Typha* spp.). Community may occur in standing water.

Cattail Marsh

34 Herbaceous cover <u>not</u> a monotypic stand of cat-tail species (*Typha* spp.). Relative cover for herbaceous layer is variable. Community occurs in moist or saturated low areas of the uplands, or at the margins of permanent water bodies.

35 Community occurs along lake margins, flooded depressions, and other wetlands that remain inundated throughout the growing season. Composition is variable and includes aquatic emergent plants as well as submerged aquatic species. Species include three-way sedge (*Dulichium arundinaceum* var. *arundinaceum*), halberd-leaf tearthumb (*Persicaria arifolia*), tearthumb (*Persicaria sagittata*), tearthumb (*Persicaria sagittata*), Joe-Pye-weed (*Eutrochium* spp.), rushes (*Juncus* spp.), beggar-ticks (*Bidens* spp.), sensitive fern (*Onoclea sensibilis*), marsh St. John's-wort (*Triadenum virginicum*), arrowhead (*Sagittaria rigida*), wapato (*Sagittaria latifolia*), dock (*Rumex* spp.), sharp-fruited rush (*Juncus acuminatus*), jewelweed (*Impatiens capensis*), tussock sedge (*Carex stricta*), sweet flag (*Acorus calamus*), rice cutgrass (*Leersia oryzoides*).

Mixed Forb Marsh

35 Community occurs on substrates that are saturated or inundated early in the growing season, but may be dry by mid- to late-summer. Composition is variable, but herbaceous species dominate. Species include goldenrods (*Solidago* spp.), rice cutgrass (*Leersia oryzoides*), wool-grass (*Scirpus cyperinus*), bugleweed (*Lycopus uniflorus*), smartweeds (*Polygonum* and Persicaria spp.), sedges (*Carex stipata* var. *stipata*, *C. canescens, C. lurida, C. cristatella, C. tribuloides, and C. vesicaria*), tussock sedge (*C. stricta*), soft rush (*Juncus effusus*), Joe-Pye-weed (*Eutrochium* spp.), New York ironweed (*Vernonia noveboracensis*), reed canary-grass (*Phalaris arundinacea*), and bulrush (*Scirpus* spp.). Scattered shrubs may be present, representative species include steeplebush (*Spiraea tomentosa*), silky dogwood (*Cornus amomum*), gray dogwood (*Cornus racemosa*), red-osier dogwood (*Cornus sericea*), and arrow-wood (*Viburnum recognitum*).

Mixed Forb – Graminoid Wet Meadow

33 Community is composed of non-persistent emergent vegetation that occurs in inundated depressions along lakeshores or pond margins, and wet depressions. Relative cover for herbaceous layer is dominated by spatterdock (*Nuphar advena* and *N. variegata*) and fragrant water-lily (*Nymphaea odorata*), or pickerel-weed (*Pontederia cordata*), arrow-arum (*Peltandra virginica*), wapato (*Sagittaria latifolia*). The appearance of these systems changes seasonally from nearly unvegetated substrate in winter and early spring, to dense vegetation during the height of the growing season. Substrate is muck and usually saturated throughout the growing season.

36 Relative cover for herbaceous layer is dominated by spatterdock (*Nuphar advena* and *N. variegata*) and fragrant water-lily (*Nymphaea odorata*). Water smartweed (*Persicaria amphibia*), arrow-arum (*Peltandra virginica*) and wapato (*Sagittaria latifolia*) are typically present at lower cover. Community is typically semi-inundated.

Spatterdock - Water-lily Emergent Wetland

36 Relative cover for herbaceous layer is dominated by pickerel-weed (*Pontederia cordata*), arrow-arum (*Peltandra virginica*), and wapato (*Sagittaria latifolia*).

Pickerel-weed - Arrow-arum - Arrowhead Emergent Wetland

SHRUBLAND GROUP (SLG)

1 Riparian vegetation found along floodplains on islands, shorelines, gravel bars, or riverbeds. Relative cover for shrub layer is dominated by either alders (*Alnus* spp.), willows (*Salix* spp.), dogwoods (*Cornus* spp.), water-willow (*Decodon verticillatus*), bayberry (*Myrica* spp.), buttonbush (*Cephalanthus occidentalis*), sycamore (*Platanus occidentalis*), silver maple (*Acer saccharinum*), or river birch (*Betula nigra*).

2 Relative cover for shrub layer is dominated by some combination of sycamore (*Platanus occidentalis*), silver maple (*Acer saccharinum*), eastern cottonwood (*Populus deltoides*), river birch (*Betula nigra*), and black willow (*Salix nigra*).

Mixed Hardwood Floodplain Thicket

2 Relative cover for shrub layer is dominated by either alders (*Alnus* spp.), willows (*Salix* spp.), dogwoods (*Cornus* spp.), bayberry (*Myrica pensylvanica*), water-willow (*Decodon verticillatus*), or buttonbush (*Cephalanthus occidentalis*).

3 Relative cover for shrub layer is greater for alders (*Alnus* spp.) than willows (*Salix* spp.). Shrub layer is dominated by speckled alder (*Alnus incana ssp. rugosa*) and smooth alder (*Alnus serrulata*) with a combination of black willow (*Salix nigra*), ninebark (*Physocarpus opulifolius*), or silky dogwood (*Cornus amomum*). Water-willow (*Decodon verticillatus*) or buttonbush (*Cephalanthus occidentalis*) are absent or scattered throughout.

Alder - Dogwood Floodplain Thicket

3 Relative cover for shrub layer is dominated by willows (*Salix* spp.), dogwoods (*Cornus* spp.), bayberry (*Myrica pensylvanica*), water-willow (*Decodon verticillatus*), or buttonbush (*Cephalanthus occidentalis*). Alders (*Alnus* spp.) are either co-dominant or absent.

4 Community is found along scour zones or island heads along major rivers. Sandbar willow (*Salix exigua*) and black willow (*Salix nigra*) are typically the dominant short shrubs (<2m in height), with occasional sycamore (*Platanus occidentalis*), river birch (*Betula nigra*), silver maple (*Acer saccharinum*), box-elder (*Acer negundo*), hardhack (*Spiraea tomentosa*), silky dogwood (*Cornus amomum*), and honey-locust (*Gleditsia triacanthos*). Herbaceous species may include: Indian-grass (*Sorghastrum nutans*), big bluestem (*Andropogon gerardii*), Indian hemp (*Apocynum cannabinum*), smartweeds (*Persicaria* spp.), or pink dogbane (*Apocynum androsaemifolium*).

Willow – Indian-grass Floodplain Shrub Wetland

4 Community typically occurs along shorelines, back channels, or tributaries.

5 Black willow (*Salix nigra*) is clearly the dominant shrub species with alder (*Alnus* spp.), dogwoods (*Cornus* spp.), and other willows (*Salix* spp.) typically present. Herbaceous layer is variable but usually includes smartweeds (*Persicaria* spp.), beggar-ticks (*Bidens* spp.), and/or reed canary-grass (*Phalaris arundinacea*).

Black Willow Floodplain Thicket

5 Relative cover is <u>not</u> dominated by black willow (*Salix nigra*).

6 Dominant species include one or a combination of the following: bayberry (*Myrica pensylvanica*), willows (*Salix* spp.), dogwoods (*Cornus* spp.), and/or meadow-sweet (*Spiraea* spp.).

7 Dominant species include bayberry (*Myrica pensylvanica*), silky dogwood (*Cornus amomum*), red-osier dogwood (*Cornus sericea*), and willows (*Salix* spp.), with scattered eastern cottonwood (*Populus deltoides*) and European white birch (*Betula pendula*). This community is found only on Presque Isle within the Great Lakes region of Pennsylvania.

Great Lakes Bayberry - Mixed Shrub Wetland

7 Dominant species include one or a combination of the following: willows (*Salix* spp.), dogwoods (*Cornus* spp.), and/or meadow-sweet (*Spiraea* spp.). Other shrub species, such as northern arrow-wood (*Viburnum recognitum*) and alders (*Alnus* spp.) may also be present as associate species.

Circumneutral Mixed Shrub Wetland

6 Relative cover for shrub layer is dominated by water-willow (*Decodon verticillatus*) or buttonbush (*Cephalanthus occidentalis*).

8 Relative cover for shrub layer is dominated by water-willow (*Decodon verticillatus*), although buttonbush (*Cephalanthus occidentalis*) may be present but is not dominant.

Water-willow (*Decodon verticillatus*) Shrub Wetland

8 Relative cover for shrub layer is dominated by buttonbush (*Cephalanthus occidentalis*) although water-willow (*Decodon verticillatus*) may be present but is not dominant.

Buttonbush Wetland

1 Palustrine vegetation found in basin depressions. Relative cover for shrub layer is dominated by either leatherleaf (*Chamaedaphne calyculata* var. *angustifolia*), alders (*Alnus* spp.), swamp rose (*Rosa palustris*), dogwoods (*Cornus* spp.), willows (*Salix* spp.), meadow-sweet (*Spiraea* spp.), winterberry (*Ilex verticillata*), mountain holly (*Ilex mucronata*), highbush blueberry (*Vaccinium corymbosum*), buckthorn (*Rhamnus* spp.), eastern red-cedar (*Juniperus virginiana*), poison sumac (*Toxicodendron vernix*), bayberry (*Myrica* spp.), water-willow (*Decodon verticillatus*), or buttonbush (*Cephalanthus occidentalis*).

9 Relative cover for shrub layer is dominated by either leatherleaf (*Chamaedaphne calyculata* var. *angustifolia*), alders (*Alnus* spp.), winterberry (*Ilex verticillata*), mountain holly (*Ilex mucronata*), highbush blueberry (*Vaccinium corymbosum*), swamp rose (*Rosa palustris*), dogwoods (*Cornus* spp.), willows (*Salix* spp.), or meadow-sweet (*Spiraea* spp.).

10 Relative cover for shrub layer is mainly dominated by leatherleaf (*Chamaedaphne calyculata* var. *angustifolia*).

11 Leatherleaf is typically under 0.3 meters in height.

12 Leatherleaf (*Chamaedaphne calyculata* var. *angustifolia*), sedges (*Carex* spp.), and sphagnum moss (*Sphagnum* spp.) dominate the community. This community usually occurs in upland depressions influenced by impoundments or may be present in glacial bogs.

Leatherleaf – Sedge Wetland

12 Leatherleaf (*Chamaedaphne calyculata* var. *angustifolia*) is stunted and intermixed with cranberry species (*Vaccinium oxycoccos* and *Vaccinium macrocarpon*), and sphagnum moss (*Sphagnum* spp.). This community often represents the zone of rooted vegetation adjacent to open water (i.e. bog lake) and may grade into the Leatherleaf - Bog Rosemary Bog type.

Leatherleaf - Cranberry Bog

11 Leatherleaf (*Chamaedaphne calyculata* var. *angustifolia*) is over 0.3 meters in height.

13 Leatherleaf (*Chamaedaphne calyculata* var. *angustifolia*), sedges (*Carex* spp.), and sphagnum moss (*Sphagnum* spp.) dominate the community. This community usually occurs in upland depressions influenced by impoundments or may be present in glacial bogs.

Leatherleaf – Sedge Wetland

13 Leatherleaf (*Chamaedaphne calyculata* var. *angustifolia*) is intermixed with other shrub species.

14 Leatherleaf (*Chamaedaphne calyculata* var. *angustifolia*) is dominant or co-dominant with sweet-gale (*Myrica gale*) and shrubs are nearly waist high and very dense. Other low shrubs like rhodora (*Rhododendron canadense*), sheep laurel (*Kalmia angustifolia*), chokeberry (*Photinia* spp.), and bog laurel (*Kalmia polifolia*) are common. Sphagnum moss (*Sphagnum* spp.) is typically present.

Sweet-gale – Leatherleaf Shrub Fen

14 Leatherleaf (*Chamaedaphne calyculata* var. *angustifolia*) is dominant shrub species but is intermixed with sheep laurel (*Kalmia angustifolia*), bog-rosemary (*Andromeda polifolia* var. *glaucophylla*), chokeberry (*Photinia* spp.), black huckleberry (*Gaylussacia baccata*), and Labrador tea (*Rhododendron groenlandicum*).

Leatherleaf - Bog Rosemary Bog

10 Relative cover for shrub layer is mainly dominated by swamp rose (*Rosa palustris*), dogwoods (*Cornus* spp.), willows (*Salix* spp.), meadow-sweet (*Spiraea* spp.), alder (*Alnus* spp.), winterberry (*Ilex verticillata*), mountain holly (*Ilex mucronata*), or highbush blueberry (*Vaccinium corymbosum*).

15 Relative cover is dominated by one or a combination of swamp rose (*Rosa palustris*), dogwoods (*Cornus* spp.), willows (*Salix* spp.), or meadow-sweet (*Spiraea* spp.). Other shrub species, such as northern arrow-wood (*Viburnum recognitum*) and alders (*Alnus* spp.) may also be present as associate species.

Circumneutral Mixed Shrub Wetland

15 Relative cover is clearly dominated by either alders (*Alnus* spp.), winterberry (*Ilex verticillata*), mountain holly (*Ilex mucronata*), or highbush blueberry (*Vaccinium corymbosum*).

16 Relative cover for shrub layer is mainly dominated by either smooth alder (*Alnus serrulata*), speckled alder (*Alnus incana* ssp. *rugosa*), winterberry (*Ilex verticillata*), or mountain holly (*Ilex mucronata*).

17 Relative cover is dominated by a combination of alders (*Alnus* spp.), willows (*Salix* spp.), dogwoods (*Cornus* spp.), American elder (*Sambucas canadensis*), buttonbush (*Cephalanthus occidentalis*), and water-willow (Decodon verticillatus). Sphagnum moss (Sphagnum spp.) is generally absent although other mosses may be present.

Circumneutral Mixed Shrub Wetland

17 Relative cover is dominated by a combination of alders (*Alnus* spp.), maleberry (*Lyonia ligustrina*), winterberry (*Ilex verticillata*), mountain holly (*Ilex mucronata*), highbush blueberry (*Vaccinium corymbosum*), and/or leatherleaf (*Chamaedaphne calyculata* var. *angustifolia*). Sphagnum moss (*Sphagnum* spp.) and sedges (*Carex* spp.) dominate the herbaceous layer.

Acidic Mixed Shrub – Sphagnum Wetland

16 Relative cover for shrub layer is mainly dominated by highbush blueberry (*Vaccinium corymbosum*).

18 In addition to highbush blueberry (*Vaccinium corymbosum*); meadow-sweet (*Spirea* spp.) is present and herbaceous layer contains very little to no sphagnum moss (*Sphagnum* spp.).

Highbush Blueberry – Meadow-sweet Wetland

18 In addition to highbush blueberry (*Vaccinium corymbosum*); cinnamon fern (*Osmunda cinnamomea*), sphagnum moss (*Sphagnum* spp.), and sedges (Carex spp.) dominate the herbaceous layer.

Highbush Blueberry – Sphagnum Wetland

9 Relative cover for shrub layer is dominated by either buckthorn (*Rhamnus* spp.), eastern red-cedar (*Juniperus virginiana*), poison sumac (*Toxicodendron vernix*), water-willow (*Decodon verticillatus*), buttonbush (*Cephalanthus occidentalis*), or bayberry (*Myrica* spp.).

19 Relative cover for shrub layer is dominated by either buckthorn (*Rhamnus* spp.), eastern red-cedar (*Juniperus virginiana*), poison sumac (*Toxicodendron vernix*), or bayberry (*Myrica pensylvanica*).

20 Relative shrub cover is dominated by bayberry (*Myrica pensylvanica*).

21 Dominant species include bayberry (*Myrica pensylvanica*), silky dogwood (*Cornus amomum*), red-osier dogwood (*Cornus sericea*), and willows (*Salix* spp.), with scattered eastern cottonwood (*Populus deltoides*). This community is found only on Presque Isle within the Great Lakes region of Pennsylvania.

Great Lakes Bayberry - Mixed Shrub Wetland

21 Relative cover for shrub layer is dominated by a combination of eastern red-cedar (*Juniperus virginiana*), poison sumac (*Toxicodendron vernix*), or bayberry (*Myrica pensylvanica*). Shrubby cinquefoil (*Potentilla fruticosa*) is often present.

Poison Sumac – Red-cedar – Bayberry Fen

20 Relative shrub cover is <u>not</u> dominated by bayberry (*Myrica pensylvanica*).

22 Relative cover for shrub layer is dominated by alder-leaved buckthorn (*Rhamnus alnifolia*), sedge (*Carex interior*), and golden ragwort (*Packera aurea*).

Alder-leaved Buckthorn - Inland Sedge - Golden Ragwort Shrub Fen

22 Relative cover for shrub layer is dominated by a combination of eastern red-cedar (*Juniperus virginiana*), poison sumac (*Toxicodendron vernix*), or bayberry (*Myrica pensylvanica*). Shrubby cinquefoil (*Potentilla fruticosa*) is often present.

Poison Sumac – Red-cedar – Bayberry Fen

19 Relative cover for shrub layer is dominated by water-willow (*Decodon verticillatus*) or buttonbush (*Cephalanthus occidentalis*).

23 Relative cover for shrub layer is dominated by water-willow (*Decodon verticillatus*), although buttonbush (*Cephalanthus occidentalis*) can be present with a lower percent cover.

Water-willow (*Decodon verticillatus*) Shrub Wetland

23 Relative cover for shrub layer is dominated by buttonbush (*Cephalanthus occidentalis*) although water-willow (Decodon verticillatus) can be present with a lower percent cover.

Buttonbush Wetland

WOODLAND GROUP (WLG)

1 Relative cover of combined canopy and subcanopy for broadleaf deciduous species is greater than 75%. Red maple (*Acer rubrum*) is typically the dominant tree species.

2 Relative cover of the shrub layer is less than 25%. Substrate is predominantly standing water between hummocks with a thick sedge herbaceous layer.

Red maple – Sedge Palustrine Woodland

2 Relative cover of the shrub layer is greater than 25%.

3 Relative cover for shrub layer is dominated by red maple (*Acer rubrum*) and highbush blueberry (*Vaccinium corymbosum*). Other shrubs may include rosebay (*Rhododendron maximum*). Herbaceous layer has a strong Sphagnum moss (*Sphagnum* spp.) component.

Red maple – Highbush Blueberry Palustrine Woodland

3 Relative cover for shrub layer is dominated by red maple (*Acer rubrum*) and a combination of one or more of the following: willows (*Salix* spp.), spicebush (*Lindera benzoin*), winterberry (*Ilex verticillata*), smooth alder (*Alnus serrulata*), swamp rose (*Rosa palustris*), and buttonbush (*Cepthanthus occidentalis*). Sphagnum moss (*Sphagnum* spp.) is either absent or sparse in herbaceous layer.

Red maple – Mixed Shrub Palustrine Woodland

1 Relative cover for combined canopy and subcanopy for coniferous species is greater than 25%.

4 Relative cover for combined canopy and subcanopy for coniferous species is greater than 25% but less than 75%.

5 Relative cover for combined canopy and subcanopy is dominated or co-dominated by red spruce (*Picea rubens*) and/or American larch/tamarack (*Larix laricina*). Common hardwood species include yellow birch (*Betula alleghaniensis*), red maple (*Acer rubrum*), black ash (*Fraxinus nigra*), and occasionally sourgum (*Nyssa sylvatica*). The shrub layer can be dense and may include mountain holly (*Ilex mucronata*), highbush blueberry (*Vaccinium corymbosum*), winterberry (*Ilex verticillata*), swamp azalea (*Rhododendron viscosum*), and witherod (*Viburnum cassinoides*). Sphagnum moss (*Sphagnum* spp.) is usually present and substrate is composed of peat.

Red Spruce – Mixed Hardwood Palustrine Woodland

5 Relative cover for combined canopy and subcanopy is dominated by eastern hemlock (*Tsuga canadensis*). Associated hardwood species are yellow birch (*Betula alleghaniensis*), red maple (*Acer rubrum*), black ash (*Fraxinus nigra*), sourgum (*Nyssa sylvatica*), and gray birch (*Betula populifolia*). Rosebay (*Rhododendron maximum*) often forms a dense understory; other shrubs include highbush blueberry (*Vaccinium corymbosum*), winterberry (*Ilex verticillata*), swamp azalea (*Rhododendron viscosum*), mountain holly (*Kalmia latifolia*), maleberry (*Lyonia ligustrina*), leatherleaf (*Chamaedaphne calyculata* var. *angustifolia*), sheep laurel (*Kalmia angustifolia*), and witherod (*Viburnum cassinoides*).

Hemlock – Mixed Hardwood Palustrine Woodland

4 Relative cover for combined canopy and subcanopy for coniferous species is greater than 75%.

6 Relative cover for combined canopy and subcanopy is dominated by black spruce (*Picea mariana*) and/or American larch/ tamarack (*Larix laricina*). Typically, there is an extensive shrub layer usually dominated by leatherleaf (*Chamaedaphne calyculata* var. *angustifolia*), highbush blueberry (*Vaccinium corymbosum*), and/or rosebay (*Rhododendron maximum*). Sphagnum moss (*Sphagnum* spp.) is present. Substrate is composed of peat.

Black Spruce - Tamarack Palustrine Woodland

6 Relative cover for combined canopy and subcanopy is dominated by pitch pine (*Pinus rigida*). Leatherleaf (*Chamaedaphne calyculata* var. *angustifolia*) typically forms a dense shrub layer. Other shrubs include black chokeberry (*Photinia melanocarpa*), velvet-leaf blueberry (*Vaccinium myrtilloides*), sheep laurel (*Kalmia angustifolia*), Labrador tea (*Rhododendron groenlandicum*), rhodora (*Rhododendron canadense*), black huckleberry (*Gaylussacia baccata*), and scattered highbush blueberry (*Vaccinium corymbosum*). Sphagnum moss (*Sphagnum* spp.) is present.

Pitch Pine – Leatherleaf Palustrine Woodland

FOREST GROUP (FG)

1 Relative cover of coniferous species for combined canopy and subcanopy is greater than 25%.

2 Relative cover of coniferous species for combined canopy and subcanopy is between 25% and 75%. The deciduous portion of the canopy may be a combination of yellow birch (*Betula alleghaniensis*), red maple (*Acer rubrum*), sourgum (*Nyssa sylvatica*), black ash (*Fraxinus nigra*), and/or gray birch (*Betula populifolia*).

3 Canopy cover for coniferous species is dominated by red spruce (*Picea rubens*). Other conifers, such as eastern hemlock (*Tsuga canadensis*), eastern white pine (*Pinus strobus*), American larch/tamarack (*Larix laricina*), or balsam fir (*Abies balsamea*) may also be present at lower coverage.

Red Spruce – Mixed Hardwood Palustrine Forest

3 Canopy cover for coniferous species is dominated by eastern hemlock (*Tsuga canadensis*) and/or eastern white pine (*Pinus strobus*). Other conifers, such as red spruce (*Picea rubens*), American larch/tamarack (*Larix laricina*), and balsam fir (*Abies balsamea*) may also be present at lower coverage.

Hemlock – Mixed Hardwood Palustrine Forest

2 Relative cover of coniferous species for combined canopy and subcanopy is greater than 75%.

4 Relative cover for combined canopy and subcanopy is greater for eastern hemlock (*Tsuga canadensis*) and/or eastern white pine (*Pinus strobes*) than spruce (*Picea* spp.) and American larch/tamarack (*Larix laricina*). Community typically has a hummock and pool micro-topography. Rosebay (*Rhododendron maximum*) typically forms a dense shrub layer.

Hemlock Palustrine Forest

4 Relative cover for combined canopy and subcanopy is greater for either red spruce (*Picea rubens*), black spruce (*Picea mariana*), or American larch/tamarack (*Larix laricina*) than relative cover for eastern hemlock (*Tsuga canadensis*) and/or eastern white pine (*Pinus strobus*).

5 Relative cover for combined canopy and subcanopy is dominated or co-dominated by red spruce (*Picea rubens*) and/or American larch/tamarack (*Larix laricina*). The substrate is typically either shallow organic soils or mineral soils with substantial surface accumulation of organic material (histic epipedon).

Red Spruce Palustrine Forest

5 Relative cover for combined canopy and subcanopy is dominated by black spruce (*Picea mariana*) and/or American larch/tamarack (*Larix laricina*). The substrate consists of peat.

Black Spruce – Tamarack Peatland Forest

1 Relative cover of broadleaf deciduous species for combined canopy and subcanopy is greater than 75%.

6 Relative cover for combined canopy and subcanopy is dominated by maple species (*Acer* spp.), elm species (*Ulmus* spp.), black ash (*Fraxinus nigra*), or sourgum (*Nyssa sylvatica*). While oak species (*Quercus* spp.) and green/red ash may be present, they are not dominant in the forest canopy.

7 Relative cover for combined canopy and subcanopy is co-dominated by red maple (*Acer rubrum*) and some combination of one or more of the following: sweet-bay magnolia (*Magnolia virginiana*), sweetgum (*Liquidambar styraciflua*), sourgum (*Nyssa sylvatica*), ash species (*Fraxinus* spp.), and/or elm species (*Ulmus* spp.).

8 Community is dominated by red maple (*Acer rubrum*) and a diverse mix of overstory hardwood species including sweet-bay magnolia (*Magnolia virginiana*) and sweetgum (*Liquidambar styraciflua*). Community is limited to the Coastal Plain and Piedmont within Pennsylvania.

9 Community is found in permanently inundated wetlands and dominated by red maple; sweet-bay magnolia (*Magnolia virginiana*) and sweetgum (*Liquidambar styraciflua*) are also present; sweet pepperbush (Clethra alnifolia), fetter-bush (Leucothoe racemosa), winterberry (Ilex verticillata), smooth winterberry (Ilex laevigata), highbush blueberry (Vaccinium corymbosum), swamp azalea (Rhododendron viscosum), and possum-haw (Viburnum nudum). The herbaceous layer is often sparse. Community is limited to the Coastal Plain, restricted to low-lying areas of the Coastal Plain, with outliers occurring in the Piedmont and South Mountain sections Piedmont within Pennsylvania.

Red Maple - Magnolia Palustrine Forest

9 Community is found in depressions that are often flooded during winter and spring and is dominated by sweetgum (*Liquidambar styraciflua*). The herbaceous layer is variable; it is sparse where water stands for the longest time. Willow oak (*Quercus phellos*) and swamp chestnut oak (*Quercus michauxii*) are also present, in addition to other overstory hardwood species. Swamp dog-hobble (*Leucothoe racemosa*), sweet pepperbush (*Clethra alnifolia*), highbush blueberry (*Vaccinium corymbosum*), and southern arrow-wood (*Viburnum dentatum*) are characteristic shrubs. Community is limited to the Coastal Plain of Pennsylvania (Bucks County).

Sweetgum – Willow Oak Coastal Plain Palustrine Forest

8 Combined overstory a diverse mix of overstory hardwood species in addition to red maple (*Acer rubrum*) including sourgum (*Nyssa sylvatica*), ash species (*Fraxinus* spp.), yellow birch (*Betula allegheniensis*), and oaks (*Quercus* spp.). Forest canopy and subcanopy does not contain sweet-bay magnolia (*Magnolia virginiana*) or sweetgum (*Liquidambar styraciflua*). Community is not limited to the Coastal Plain and Piedmont within Pennsylvania.

10 Relative cover for combined canopy and subcanopy is dominated by red maple (*Acer rubrum*) and/or blackgum/sourgum (*Nyssa sylvatica*). Other canopy trees include yellow birch (*Betula allegheniensis*), pin oak (*Quercus palustris*), and eastern hemlock (*Tsuga canadensis*). Soil and water pH is acidic.

Red Maple – Black-gum Palustrine Forest

10 Relative cover for combined canopy and subcanopy is dominated by red maple (*Acer rubrum*) and ash species (*Fraxinus* spp.). Other canopy trees include yellow birch (*Betula allegheniensis*) and pin oak (*Quercus palustris*). Sourgum (*Nyssa sylvatica*) may occasionally occur, but is never co-dominant.

11 Community occurs in the back-swamp of the river floodplain, in abandoned oxbow-wetlands, and in depressions behind natural levees. Relative cover for combined canopy and subcanopy is dominated by red maple (*Acer rubrum*), red ash/green ash (*Fraxinus pennsylvanica*), American elm (*Ulmus americana*), slippery elm (*Ulmus rubra*), swamp white oak (*Quercus bicolor*), and pin oak (*Quercus palustris*).

Red Maple – Elm – Willow Floodplain Swamp

11 Community occurs primarily in headwater wetlands (not situated with the floodplain of major rivers). Species composition is influenced by calcareous groundwater; pH is circumneutral. Relative cover for combined canopy and subcanopy is dominated by red maple (*Acer rubrum*), black ash (*Fraxinus nigra*), red ash/green ash (*Fraxinus pennsylvanica*), American elm (*Ulmus americana*), or slippery elm (*Ulmus rubra*).

12 Community is specific to Great Lakes Region; the canopy and subcanopy are composed of a wide variety of species including red maple (*Acer rubrum),* American elm (*Ulmus americana*), black ash (*Fraxinus nigra*), red ash/green ash (*Fraxinus pennsylvanica*), and/or pumpkin ash (*Fraxinus profunda).* Soils are not saturated throughout the year contributing to the high diversity of wetland and upland tree and shrub species.

Elm - Ash - Maple Lakeplain Forest

12 Relative cover for combined canopy and subcanopy is dominated by red maple (*Acer rubrum*), black ash (*Fraxinus nigra*), swamp white oak (*Quercus bicolor*), and American elm (*Ulmus americana*). There is little to no sourgum (*Nyssa sylvatica*) present. Soils remain flooded and/or saturated throughout the year.

Red Maple – Black Ash Palustrine Forest

7 Relative cover for combined canopy and subcanopy is dominated by silver maple (*Acer saccharinum*) or sugar maple (*Acer saccharum*). White ash (*Fraxinus americana*) may be a co-dominant canopy species.

13 Relative cover for combined canopy and subcanopy is dominated by sugar maple (*Acer saccharum*). Other canopy species may include American basswood (*Tilia americana*), white ash (*Fraxinus americana*), silver maple (*Acer saccharinum*), black walnut (*Juglans nigra*), red ash/green ash (*Fraxinus pennsylvanica*), bitternut hickory (*Carya cordiformis*), black maple (*Acer nigrum*), and American beech (*Fagus grandifolia*). Community is usually located along mid- to high-floodplain terraces.

Sugar Maple – Mixed Hardwood Floodplain Forest

13 Relative cover for combined canopy and subcanopy is dominated by silver maple (*Acer saccharinum*) but other species can be present, such as sycamore (*Platanus occidentalis*), red maple (*Acer rubrum*), black willow (*Salix nigra*), river birch (*Betula nigra*), box-elder (*Acer negundo*), red ash/green ash (*Fraxinus pennsylvanica*), and elms (*Ulmus americana* and *Ulmus rubra*). Found along large rivers on well-developed floodplains and islands.

Silver Maple Floodplain Forest

6 Relative cover for combined canopy and subcanopy is dominated by red ash/green ash (*Fraxinus pennsylvanica*), oaks (*Quercus* spp.), sycamore (*Platanus occidentalis*), or bitternut hickory (*Carya cordiformis*).

14 Relative cover for combined canopy and subcanopy is dominated by red ash/green ash (*Fraxinus pennsylvanica*) or oaks (*Quercus* spp.)

15 Relative cover for combined canopy and subcanopy is dominated by red ash/green ash (*Fraxinus pennsylvanica*). Associate canopy species include black walnut (*Juglans nigra*) and sycamore (*Platanus occidentalis*). Community occurs on floodplains and terraces.

Green Ash – Mixed Hardwood Palustrine Forest

15 Relative cover for combined canopy and subcanopy is dominated by pin oak (*Quercus palustris*) and/or swamp white oak (*Quercus bicolor*). Associate canopy species include red ash/green ash (*Fraxinus pennsylvanica*), American elm (*Ulmus americana*), sourgum (*Nyssa sylvatica*), and black ash (*Fraxinus nigra*). Community typically occurs in backswamps.

Oak - Mixed Hardwood Palustrine Forest

14 Relative cover for combined canopy and subcanopy is dominated by sycamore (*Platanus occidentalis*) or bitternut hickory (*Carya cordiformis*). Community occurs on floodplains or terraces.

16 Canopy is dominated by sycamore (*Platanus occidentalis*).

17 Relative cover for combined canopy and subcanopy is dominated by sycamore (*Platanus occidentalis*); river birch (*Betula nigra*) is co-dominant or sub-dominant. Associate canopy species include sugar maple (*Acer saccharum*) (on smaller tributaries), silver maple (*Acer saccharinum*), and red/green ash (*Fraxinus pennsylvanica*).

Sycamore – Mixed Hardwood Floodplain Forest

17 Relative cover for combined canopy and subcanopy is dominated by sycamore (*Platanus occidentalis*); river birch (*Betula nigra*) is typically absent. Co-dominant or associate canopy species include sugar maple (*Acer saccharum*) (on smaller tributaries) and silver maple (*Acer saccharinum*).

Sycamore Floodplain Forest

16 Canopy is dominated by bitternut hickory (*Carya cordiformis*). Co-dominant or associate canopy species include northern red oak (*Quercus rubra*), butternut (*Juglans cinerea*), wild black cherry (*Prunus serotina*), sugar maple (*Acer saccharum*), American elm (*Ulmus americana*), white ash (*Fraxinus americana*), and silver maple (*Acer saccharinum*).

Bitternut Hickory Floodplain Forest