

KEY TO THE NATURAL VEGETATION OF SHENANDOAH NATIONAL PARK

- 1**
Vegetation of uplands, not influenced by flooding or groundwater.....2
Vegetation of wetlands, e.g., ponds, floodplains, or groundwater-saturated habitats.....47

- 2**
Trees (> 6m tall) forming an open to closed canopy; forest and woodland vegetation.....3
Trees generally absent; if present, very few and severely stunted (< 6m tall); surficial rock generally abundant; shrub, herbaceous, and non-vascular vegetation of exposed, rocky habitats.....39

TERRESTRIAL FOREST AND WOODLAND VEGETATION

- 3**
Conifers contributing at least 5% cover to the tree layers (overstory and understory).....4
Conifers absent or of very low cover in tree layers.....15

FORESTS AND WOODLANDS WITH A CONIFEROUS COMPONENT

- 4**
Tsuga canadensis, *Pinus strobus*, *Abies balsamea*, or *Picea rubens* contributing > 5% cover to the tree layers; or snags of adelgid-killed *Tsuga* or *Abies* abundant.....5
Tsuga canadensis, *Abies balsamea*, and *Picea rubens* absent or present only at low cover; *Juniperus virginiana* and/or *Pinus* spp. other than *Pinus strobus* present (may be at low cover and with or without *Pinus strobus*).....11

- 5**
Robinia pseudoacacia abundant, or mixed with other early successional trees (*Pinus strobus* sometimes important); weedy forests of old fields and home sites, with exotic herbs often abundant.....
.....**Black Locust Successional Forest**
***Robinia pseudoacacia* Forest (CEGL007279)**
Robinia pseudoacacia absent or unimportant.....6

- 6**
Forests of higher elevations, generally distributed above 3200 ft but ranging more locally down to ~ 3000 ft.....7
Forests of lower elevations, generally distributed below 3200 ft, some types ranging up to ~ 3400 ft.....8

- 7**
Betula alleghaniensis co-dominant with *Quercus rubra* (*Tsuga canadensis* and/or *Abies balsamea* are sometimes associated); usually on steep, rocky, sheltered slopes.....

.....**Central Appalachian Northern Hardwood Forest**
***Betula alleghaniensis* – *Quercus rubra* / *Acer (pensylvanica, spicatum)* / *Dryopteris intermedia* –
Oclomena acuminata Forest (CEGL008502)**

Betula alleghaniensis a minor component; *Quercus rubra* dominant or co-dominant with *Quercus alba* (*Tsuga canadensis*, *Pinus strobus*, *Abies balsamea*, and/or *Picea rubens* are sometimes associated); on upper slopes and crests.....**Northern Red Oak Forest**

***Quercus rubra* – *Quercus alba* / *Ilex montana* / *Dennstaedtia punctilobula* – *Carex pensylvanica* – *Deschampsia flexuosa* Forest (CEGL008506)**

8

Mesophytic forests of stream bottoms, ravines, and sheltered slopes.....9

Drier, oak-dominated forests of various, usually more exposed landforms.....10

9

Tsuga canadensis dominant or co-dominant with *Betula alleghaniensis*; stream bottoms, ravines, flats, and north-facing slopes at lower to middle elevations (~ 2000 to 3300 ft).....

.....**Hemlock – Northern Hardwood Forest**
***Tsuga canadensis* - *Betula alleghaniensis* Lower New England / Northern Piedmont Forest (CEGL006109)**

Tsuga canadensis and *Betula alleghaniensis* absent or unimportant; *Quercus alba*, *Quercus rubra*, and *Liriodendron tulipifera* usually co-dominant; *Pinus strobus* often present, locally co-dominant; ravines and lower slopes at very low elevations (< 2000 ft).....**Central Appalachian Acidic Cove Forest**

***Pinus strobus* – *Quercus (rubra, alba)* – *Liriodendron tulipifera* Forest (CEGL006304)**

10

Forests with *Quercus prinus* strongly dominant (*Tsuga canadensis* and/or *Pinus strobus* are sometimes associated); shrub layer strongly (and usually densely) dominated by ericaceous species; herb layer typically with low to very low diversity.....

.....**Central Appalachian / Northern Piedmont Low-Elevation Chestnut Oak Forest**
***Quercus prinus* – (*Quercus coccinea*, *Quercus velutina*) / *Kalmia latifolia* / *Vaccinium pallidum* Forest (CEGL006299)**

Quercus rubra generally co-dominant with *Quercus prinus* in mixed stands (*Tsuga canadensis* and/or *Pinus strobus* are sometimes associated); *Acer pensylvanicum*, *Cornus florida*, *Corylus* spp., *Hamamelis virginiana*, and/or *Viburnum acerifolium* usually important in the shrub layer, in addition to ericaceous species; herb layer with low to moderate diversity.....

.....**Central Appalachian Dry-Mesic Chestnut Oak – Red Oak Forest**
***Quercus prinus* - *Quercus rubra* / *Hamamelis virginiana* Forest (CEGL006057)**

11

Pinus virginiana and/or *Juniperus virginiana* present at low to moderate cover; *Carya* spp. and/or *Fraxinus americana* important.....12
Carya spp. and *Fraxinus americana* absent or unimportant.....13

12

Open to closed-canopy oak-hickory forest on slopes underlain by metasedimentary substrates and with negligible to moderate cover of loose rock fragments; *Quercus alba* dominant (*Pinus virginiana* often associated).....**Central Appalachian Acidic Oak – Hickory Forest**

Quercus alba – *Quercus prinus* – *Carya glabra* / *Cornus florida* / *Vaccinium pallidum* / *Carex pensylvanica* Forest (CEGL008515)

Partially to very open woodland with stunted trees on steep slopes with numerous metabasalt (rarely phyllite or metasiltstone) outcrops; *Fraxinus americana* and/or *Carya* spp. usually co-dominant (*Juniperus virginiana* and/or *Pinus virginiana* sometimes associated); *Quercus alba* absent or unimportant.....**Central Appalachian Basic Woodland**

Fraxinus americana – *Carya glabra* / *Muhlenbergia sobolifera* – *Helianthus divaricatus* – *Solidago ulmifolia* Woodland (CEGL003683)

13

Pinus rigida and/or *P. pungens* co-dominant with *Quercus prinus*, or snags of beetle-killed pines abundant; *Quercus ilicifolia* and ericaceous shrubs forming a dense shrub layer; open to closed-canopy pine-oak woodland of cliff-tops and xeric, convex upper slopes.....

.....**Central Appalachian Pine – Oak / Heath Woodland**

Pinus (pungens, rigida) / *Quercus ilicifolia* / *Gaylussacia baccata* Woodland (CEGL004996)

Pinus rigida and/or *P. pungens* are minor canopy associates; mostly closed-canopy oak forests of dry rocky slopes and dry, Piedmont-like uplands at lower and middle elevations.....14

14

Quercus prinus generally dominant; *Quercus alba* usually absent; *Kalmia latifolia* usually common to abundant in the understory; widespread on dry, often rocky slopes.....

.....**Central Appalachian / Northern Piedmont Low-Elevation Chestnut Oak Forest**

Quercus prinus – (*Quercus coccinea*, *Quercus velutina*) / *Kalmia latifolia* / *Vaccinium pallidum* Forest (CEGL006299)

Mixed oak forest with *Quercus alba* prominent; *Kalmia latifolia* often present but not dominant; *Gaylussacia baccata* and other deciduous ericads forming a low shrub layer; confined to dry, usually gentle slopes and Piedmont-like uplands at the lowest elevations.....

.....**Mixed Oak / Heath Forest**

Quercus coccinea – *Quercus velutina* – *Quercus alba* / *Amelanchier arborea* / *Gaylussacia baccata* Forest (CEGL008521)

DECIDUOUS FORESTS AND WOODLANDS WITHOUT A CONIFEROUS COMPONENT

15

Forests and woodlands of higher elevations, generally distributed above 3200 ft but ranging more locally down to ~ 3000 ft.....16

Forests and woodland of lower elevations, generally distributed below 3200 ft, some types ranging up to ~ 3400 ft.....18

HIGH-ELEVATION DECIDUOUS FORESTS AND WOODLANDS

16

Quercus rubra dominant or co-dominant with *Quercus alba*; *Betula alleghaniensis* a minor component along with many other tree species; on convex, relatively gentle upper slopes and crests.....

Northern Red Oak Forest

Quercus rubra – *Quercus alba* / *Ilex montana* / *Dennstaedtia punctilobula* – *Carex pensylvanica* – *Deschampsia flexuosa* Forest (CEGL008506)

Betula alleghaniensis abundant, *Quercus alba* absent; usually on steep, rocky, sheltered slopes.....17

17

Betula alleghaniensis co-dominant with *Quercus rubra*; other tree species present at low cover; stands forming a closed forest, usually on steep, rocky slopes with some soil development.....

Central Appalachian Northern Hardwood Forest

Betula alleghaniensis – *Quercus rubra* / *Acer (pensylvanica, spicatum)* / *Dryopteris intermedia* – *Oclomena acuminata* Forest (CEGL008502)

Betula alleghaniensis essentially the only tree present, or mixed with *Sorbus americana*; *Polypodium appalachianum* and other high-elevation lithophytic⁴ species prevalent; stands forming a scrubby, open woodland, on very steep, very rocky slopes with little or no soil present between boulders.....

Central Appalachian High-Elevation Boulderfield Forest

Betula alleghaniensis / *Sorbus americana* – *Acer spicatum* / *Polypodium appalachianum* Forest (CEGL008504)

LOWER-ELEVATION DECIDUOUS FORESTS AND WOODLANDS

18

Ericaceous shrubs (*Gaylussacia* spp., *Kalmia latifolia*, *Menziesia pilosa*, *Rhododendron* spp., *Vaccinium* spp.) abundant and prevalent in the lower forest strata.....19

Ericaceous shrubs absent, or of low to moderate cover and admixed with non-ericaceous genera.....25

LOWER-ELEVATION DECIDUOUS FORESTS AND WOODLANDS WITH AN ABUNDANT AND PREVALENT ERICAD COMPONENT

19

Carya spp. important, and often co-dominant in the canopy.....20

Carya spp. absent or unimportant.....22

20

Quercus alba abundant; *Quercus rubra* absent or unimportant; xerophytic¹ herbs important; confined to very low elevations.....**Central Appalachian Acidic Oak – Hickory Forest**

Quercus alba – *Quercus prinus* – *Carya glabra* / *Cornus florida* / *Vaccinium pallidum* / *Carex pensylvanica* Forest (CEGL008515)

Quercus rubra important, often co-dominant with *Quercus prinus* and *Carya* spp.; dry-mesophytic² herbs more important than xerophytic¹ herbs; more widespread.....21

21

Oak-hickory forest (*Carya* spp. usually abundant) with open to sparse understory and moderate to high diversity of herbaceous species; *Betula lenta*, *Acer pensylvanicum*, *Kalmia latifolia*, *Hamamelis virginiana*, and *Viburnum acerifolium* absent or unimportant.....

.....**Central Appalachian Montane Oak – Hickory Forest (Acidic Type)**

***Quercus prinus* – *Quercus rubra* – *Carya ovalis* / *Solidago (ulmifolia, arguta)* – *Galium latifolium* Forest (CEGL008516)**

Quercus prinus – *Quercus rubra* forest (*Carya* spp. occasionally important) with diverse woody understory and moderate to low diversity of herbaceous species; *Betula lenta*, *Acer pensylvanicum*, *Kalmia latifolia*, *Hamamelis virginiana*, and/or *Viburnum acerifolium* usually present and important

.....**Central Appalachian Dry-Mesic Chestnut Oak – Red Oak Forest**

***Quercus prinus* – *Quercus rubra* / *Hamamelis virginiana* Forest (CEGL006057)**

22

Gnarled forests or open woodlands of *Betula lenta*, *Quercus prinus*, and/or *Q. rubra* on metasedimentary (rarely granitic and metabasalt) talus slopes; quartzite blocks, boulders, and stones prevalent on ground surface (usually > 40% cover); understory usually limited by rock cover and somewhat to very sparse; *Menziesia pilosa*, *Kalmia latifolia*, and/or *Vaccinium* spp. usually present.....

.....**Chestnut Oak – Black Birch Wooded Talus Slope**

***Quercus prinus* – *Betula lenta* / *Parthenocissus quinquefolia* Talus Woodland (CEGL006565)**

Open to closed-canopy forests of stunted to normal stature, dominated by *Quercus* spp., occurring on dry (often rocky) slopes and dry, Piedmont-like uplands at lower and middle elevations.....23

23

Quercus rubra generally co-dominant with *Q. prinus* in mixed stands; *Acer pensylvanicum*, *Cornus florida*, *Corylus* spp., *Hamamelis virginiana*, and/or *Viburnum acerifolium* usually important in the shrub layer, in addition to ericaceous species; herb layer with low to moderate diversity.....

.....**Central Appalachian Dry-Mesic Chestnut Oak – Red Oak Forest**

***Quercus prinus* – *Quercus rubra* / *Hamamelis virginiana* Forest (CEGL006057)**

Forests with *Quercus prinus* strongly dominant, or mixed dominance by *Quercus alba*, *Q. coccinea*, *Q. velutina*, and *Q. prinus*; shrub layer strongly (and often densely) dominated by ericaceous species; herb layer typically with low to very low diversity.....24

24

Mixed oak forest of gentle slopes and flats at the lowest elevations; *Quercus alba* prominent with other oaks; *Betula lenta* absent, *Kalmia latifolia* often present but not dominant; *Gaylussacia baccata* and other deciduous ericads forming a low shrub layer.....**Mixed Oak / Heath Forest**

***Quercus coccinea* – *Quercus velutina* – *Quercus alba* / *Amelanchier arborea* / *Gaylussacia baccata* Forest (CEGL008521)**

Quercus prinus-dominated forest widespread on moderately steep to steep slopes; *Quercus alba* absent, *Betula lenta* often present, and *Kalmia latifolia* usually common to abundant in the understory.....

.....**Central Appalachian / Northern Piedmont Low-Elevation Chestnut Oak Forest**

***Quercus prinus* (*Quercus coccinea*, *Quercus velutina*) / *Kalmia latifolia* / *Vaccinium pallidum* Forest (CEGL006299)**

LOWER-ELEVATION DECIDUOUS FORESTS AND WOODLANDS LACKING AN ABUNDANT AND PREVALENT ERICAD COMPONENT

25

Gnarled forests or woodlands of *Betula lenta*, *Quercus prinus*, and/or *Q. rubra* on metasedimentary (rarely granitic or metabasalt) talus slopes; quartzite blocks, boulders, and stones prevalent (usually > 40% cover) on ground surface; understory and herbaceous plants essentially absent.....

.....**Chestnut Oak – Black Birch Wooded Talus Slope**

***Quercus prinus* – *Betula lenta* / *Parthenocissus quinquefolia* Talus Woodland (CEGL006565)**

Forests and woodlands of more normal stature (sometimes stunted), not of metasedimentary talus slopes; understory and herbaceous plants plentiful.....26

26

Robinia pseudoacacia abundant, or mixed with other early-successional trees (e.g., *Prunus serotina*); weedy forests of old fields and homesites, with exotic herbs often abundant.....

.....**Black Locust Successional Forest**

***Robinia pseudoacacia* Forest (CEGL007279)**

Robinia pseudoacacia absent or unimportant; or if important, mixed with *Quercus* spp., *Carya* spp., and other later-successional trees.....27

27

Fagus grandifolia dominant or co-dominant in overstory; forest of lower slopes at the lowest elevations....

.....**Mid-Atlantic Mesic Mixed Hardwood Forest**

***Fagus grandifolia* – *Quercus alba* – *Liriodendron tulipifera* – *Carya* spp. Forest (CEGL006075)**

Fagus grandifolia absent or infrequent; forests of various sites at lower and middle elevations.....28

28

Dry-mesophytic² and/or xerophytic¹ forbs and graminoids prevalent in the herb layer (mesophytic³ species may also be present at low cover).....29

Mesophytic³ species prevalent in the herb layer (dry-mesophytic² species may also be present).....35

29

Mesophytic forests of coves, ravines, and lower slopes.....30

Dry-mesophytic or dry forests dominated by *Quercus* spp. and *Carya* spp., of various, usually more exposed landforms.....31

30

Forest with monospecific overstory of *Liriodendron tulipifera*, or *Liriodendron tulipifera* dominant in mixed stands with other early-successional trees (e.g., *Robinia pseudoacacia*, *Prunus serotina*); herb layer often dominated by exotic species (e.g., *Alliaria petiolata*, *Polygonum cespitosum* var. *longisetum*).....

.....**Successional Tuliptree Forest (Circumneutral Type)**

***Liriodendron tulipifera* / (*Cercis canadensis*) / (*Lindera benzoin*) Forest (CEGL007220)**

Forest with mixed overstory of *Liriodendron tulipifera*, *Quercus alba*, *Quercus rubra*, and other later-successional trees; *Pinus strobus* often present at low cover; herb layer dominated by native, dry-mesophytic² species.....**Central Appalachian Acidic Cove Forest**

Pinus strobus – *Quercus (rubra, alba)* – *Liriodendron tulipifera* Forest (CEGL006304)

31

Forest generally co-dominated by *Quercus prinus* and *Quercus rubra* (*Carya* spp. absent to occasionally important); *Betula lenta*, *Acer pensylvanicum*, *Hamamelis virginiana*, and/or *Viburnum acerifolium* usually important in the understory; *Kalmia latifolia* often present at low cover; herb layer sparse to moderate dense, with low to moderate diversity.....

.....**Central Appalachian Dry-Mesic Chestnut Oak – Red Oak Forest**

Quercus prinus – *Quercus rubra* / *Hamamelis virginiana* Forest (CEGL006057)

Forests dominated by *Quercus* spp. and *Carya* spp., the latter usually abundant; *Betula lenta*, *Acer pensylvanicum*, *Hamamelis virginiana*, *Viburnum acerifolium* and *Kalmia latifolia* absent or unimportant; herb layer with moderate to high cover and diversity.....32

32

Xerophytic¹ graminoids and forbs (especially *Muhlenbergia sobolifera*, *Elymus hystrix*, and *Pycnanthemum incanum*) prevalent in the herb layer; *Cercis canadensis* usually characteristic; low-elevation benches and rock outcrops on metabasalt (rarely phyllite or metasiltstone).....33

Dry-mesophytic² forbs and graminoids, or a mixture of dry-mesophytic² and xerophytic¹ species, prevalent in the herb layer; *Cercis canadensis* absent or unimportant; various low- to middle-elevation slopes and ridge crests on metabasalt, metasiltstone, and phyllite.....34

33

Canopy essentially closed, with trees of normal stature; *Quercus* spp. co-dominant with *Carya* spp.; *Fraxinus americana* a characteristic but minor overstory associate; on low-elevation slope benches (sometimes moderately rocky).....**Northern Hardpan Basic Oak – Hickory Forest**

Quercus alba – *Carya glabra* – *Fraxinus americana* / *Cercis canadensis* / *Muhlenbergia sobolifera* – *Elymus hystrix* Forest (CEGL006216)

Canopy partially to very open and trees stunted; *Fraxinus americana* and/or *Carya* spp. usually co-dominant; *Quercus* spp. absent or unimportant; on steep slopes with numerous rock outcrops.....

.....**Central Appalachian Basic Woodland**

Fraxinus americana – *Carya glabra* / *Muhlenbergia sobolifera* – *Helianthus divaricatus* – *Solidago ulmifolia* Woodland (CEGL003683)

34

Oak-hickory forest with dry-mesophytic² species prevalent in the herb layer; *Liriodendron tulipifera* often present, and sometimes co-dominant with the oaks and hickories; various low- to middle-elevation slopes on metabasalt.....**Central Appalachian Basic Oak – Hickory Forest (Submontane/Foothills Type)**

Quercus rubra – *Quercus prinus* – *Carya ovalis* / *Cercis canadensis* / *Solidago caesia* Forest (CEGL008514)

Oak-hickory forest with a mixture of xerophytic¹ and dry-mesophytic² species prevalent in the herb layer; *Liriodendron tulipifera* absent; middle-elevation slopes and ridge crests on metasedimentary substrates.....

.....**Central Appalachian Montane Oak – Hickory Forest (Acidic Type)**

Quercus prinus – *Quercus rubra* – *Carya ovalis* / *Solidago (ulmifolia, arguta)* – *Galium latifolium*
Forest (CEGL008516)

35

Liriodendron tulipifera important in canopy; forests of low elevations.....36
Liriodendron tulipifera absent or unimportant; forests of middle to higher elevations.....37

36

Forest with monospecific overstory of *Liriodendron tulipifera*, or *Liriodendron tulipifera* dominant in mixed stands with other early-successional trees (e.g., *Robinia pseudoacacia*, *Prunus serotina*); herb layer often dominated by exotic species (e.g., *Alliaria petiolata*, *Polygonum cespitosum* var. *longisetum*).....
.....**Successional Tuliptree Forest (Circumneutral Type)**

Liriodendron tulipifera / (*Cercis canadensis*) / (*Lindera benzoin*) Forest (CEGL007220)

Forest with more mixed overstory of *Liriodendron tulipifera* (often dominant), *Tilia americana*, *Fraxinus americana*, *Quercus rubra*, and other later-successional trees; herb layer lush and diverse, generally dominated by native species (though often containing exotics).....

.....**Southern Appalachian Cove Forest (Typic Montane Type)**

Liriodendron tulipifera – *Aesculus flava* – (*Fraxinus americana*, *Tilia americana*) / *Actaea racemosa* – *Laportea canadensis* Forest (CEGL007710)

37

Forest (sometimes very open) of metabasalt or granitic talus slopes; surface cover of boulders and stones usually > 40%; *Tilia americana*, *Fraxinus americana*, *Quercus rubra*, and/or *Ostrya virginiana* typically important in tree layers; scrambling lianas (*Parthenocissus quinquefolia*, *Vitis* spp.) often abundant; mesophytic forbs³ (e.g., *Laportea canadensis*, *Polymnia canadensis*) characteristic of the herb layer but cover often limited by the abundant rock substrate).....**Central Appalachian Basic Boulderfield Forest**

Tilia americana – *Fraxinus americana* / *Acer pensylvanicum* – *Ostrya virginiana* / *Parthenocissus* – *Impatiens pallida* Woodland (CEGL008528)

Forests of various topographic positions, not of talus slopes; surface cover of loose rocks sparse to moderate (rarely > 40%); dominant trees various; lianas with low cover; herb layer typically lush, with moderate to high cover of leafy, mesophytic forbs³38

38

Forests of concave slopes or coves; mixed canopy of *Acer saccharum*, *Tilia americana*, *Fraxinus americana*, *Betula alleghaniensis*, *Carya cordiformis*, etc.; *Quercus alba* usually absent; *Laportea canadensis*, *Impatiens pallida*, *Caulophyllum thalictroides*, and/or *Osmorhiza claytonii* most typically patch-dominant in lush herb layer; *Angelica triquinata* and *Aconitum reclinatum* often abundant locally.....**Central Appalachian Rich Cove Forest**

Acer saccharum – *Tilia americana* – *Fraxinus americana* – *Liriodendron tulipifera*) / *Actaea racemosa* Forest (CEGL006237)

Forests on straight or convex middle to upper slopes and gentle crests; mixed canopy of *Quercus rubra*, *Quercus alba*, *Carya* spp., and *Fraxinus americana*; *Ageratina altissima*, *Actaea racemosa*, *Thalictrum coriaceum*, *Asclepias exaltata*, and/or *Collinsonia canadensis* most typically patch-dominant in herb layer; *Angelica triquinata* and *Aconitum reclinatum* generally absent.....

.....**Central Appalachian Montane Oak – Hickory Forest (Basic Type)**

Quercus rubra – *Quercus alba* – *Fraxinus americana* – *Carya (ovata, ovalis)* / *Actaea racemosa* Forest (CEGL008518)

VEGETATION OF ROCK OUTCROPS AND NON-VASCULAR BOULDERFIELDS

39

Vegetation of higher elevations (> 3000 feet, or a little lower on northerly slopes).....40
Vegetation of lower elevations (< 3000 feet, or a little higher on southerly slopes).....44

VEGETATION OF HIGHER-ELEVATION ROCK HABITATS

40

Substrate consisting of large boulder talus rather than bedrock; vascular plants absent or very sparse (< 5% cover); lichens abundant.....**unclassified lichen / bryophyte boulderfield community**
Exposed bedrock prevalent, stones and large boulders may also be present.....41

41

Stunted *Fraxinus americana* characteristic; *Aster concinnus* and *Helianthus divaricatus* usually present (may be low cover); *Phacelia dubia* often abundant early in the growing season; herbaceous flora sparse to locally dense, with relatively high diversity.....
.....**Central Appalachian Mafic Barren**
***Fraxinus americana* / *Physocarpus opulifolius* / *Carex pensylvanica* - *Allium cernuum* - (*Phacelia dubia*) Wooded Herbaceous Vegetation (CEGL008529)**

Fraxinus americana, *Aster concinnus*, *Helianthus divaricatus*, and *Phacelia dubia* absent or very infrequent; herbaceous flora sparse to locally dense, with low diversity.....42

42

Photinia melanocarpa and *Gaylussacia baccata* usually dominant in patches; severely stunted *Betula lenta* and *Carex pensylvanica* often abundant.....
.....**High-Elevation Outcrop Barren**
***Photinia melanocarpa* - *Gaylussacia baccata* / *Carex pensylvanica* Shrubland (CEGL008508)**

Photinia melanocarpa absent or unimportant; *Deschampsia flexuosa* often present.....43

43

Severely stunted *Betula alleghaniensis* usually present; ericaceous species not particularly characteristic; *Diervilla lonicera*, *Solidago simplex* var. *randii*, *Hylotelephium telephoides*, *Phlox subulata*, *Sibbaldiopsis tridentata*, and/or *Saxifraga michauxii* usually present and characteristic; vegetation of metabasalt outcrops.....**High-Elevation Greenstone Barren**
***Diervilla lonicera* - *Solidago simplex* var. *randii* - *Deschampsia flexuosa* - *Hylotelephium telephoides* - *Saxifraga michauxii* Herbaceous Vegetation (CEGL008536)**

Betula alleghaniensis, *Diervilla lonicera*, *Solidago simplex* var. *randii*, *Hylotelephium telephoides*, *Phlox subulata*, *Sibbaldiopsis tridentata*, and *Saxifraga michauxii* absent; ericads characteristic; severely stunted *Pinus pungens* usually present; *Kalmia latifolia*, *Menziesia pilosa*, or *Vaccinium pallidum* usually present in abundance; vegetation of granitic or metasedimentary outcrops.....

.....**High-Elevation Acidic Heath Barren / Pavement**
***Kalmia latifolia* - *Vaccinium pallidum* Shrubland (CEGL008538)**

VEGETATION OF LOWER-ELEVATION ROCK HABITATS

44

Substrate consisting of large boulder talus rather than bedrock; vascular plants absent or very sparse (< 5% cover); lichens abundant.....**unclassified lichen / bryophyte boulderfield community**
Exposed bedrock prevalent, stones and large boulders may also be present.....45

45

Xerophytic pines (*Pinus rigida*, *Pinus pungens*), *Quercus ilicifolia*, and ericaceous shrubs always present and characteristic (cover may be sparse); exposed metasedimentary (rarely granitic) cliffs.....

.....**Central Appalachian Pine – Oak / Heath Woodland**

Pinus (pungens, rigida) / Quercus ilicifolia / Gaylussacia baccata Woodland (CEGL004996)

Xerophytic pines and *Quercus ilicifolia* absent; exposed outcrops of metabasalt and pyroxene-bearing granitic rocks.....46

46

Scrub / herbaceous vegetation of low elevations, generally < 1900 ft; *Cercis canadensis*, *Rhus aromatica*, *Juniperus virginiana*, and/or *Cheilanthes lanosa* usually present and characteristic; low-elevation lithophytes⁵ present and important; *Physocarpus opulifolius* and *Rhus typhina* not abundant, usually absent; *Aster concinnus* and *Hylotelephium telephoides* absent.....

.....**Central Appalachian Circumneutral Barren**

Juniperus virginiana - Fraxinus americana / Carex pensylvanica - Cheilanthes lanosa Wooded Herbaceous Vegetation (CEGL006037)

Scrub / herbaceous vegetation of middle elevations, from 1800 to 3400 ft; *Aster concinnus* and *Hylotelephium telephoides* usually present and characteristic; *Physocarpus opulifolius* and/or *Rhus typhina* locally abundant; *Cercis canadensis*, *Rhus aromatica*, *Juniperus virginiana*, and *Cheilanthes lanosa* absent.....

.....**Central Appalachian Mafic Barren**

Fraxinus americana / Physocarpus opulifolius / Carex pensylvanica - Allium cernuum - (Phacelia dubia) Wooded Herbaceous Vegetation (CEGL008529)

WETLAND VEGETATION

47

Forested wetlands.....48

Wetlands lacking a forest canopy.....55

FORESTED WETLANDS

48

Forested wetlands of alluvial floodplains and stream bottoms.....49

Forested wetlands of other settings.....51

49

Low-elevation floodplains filled with bouldery quartzite alluvium; habitats often dry and wetland indicator plants nearly lacking; forest vegetation characterized by oaks (*Quercus prinus*, *Q. rubra*, *Q. alba*), *Pinus strobus*, and other dry and dry-mesophytic upland species.....

.....**Central Appalachian Dry-Mesic Chestnut Oak – Red Oak Forest**

Quercus prinus – Quercus rubra / Hamamelis virginiana Forest (CEGL006057)

Floodplains with alluvium derived from various bedrock types (metabasalt, granitic, metasedimentary); habitats mesic, supporting mesophytic forest vegetation; oaks absent or occurring in admixture with mesophytic tree species.....50

50

Tsuga canadensis and *Betula alleghaniensis* generally absent or of minor importance; *Platanus occidentalis*, *Ulmus americana*, *Juglans nigra*, *Fraxinus pensylvanica*, *Carpinus caroliniana*, and/or *Polygonum virginianum* often present (may be low cover); diverse forests of well-developed, mountain-foot floodplains at the lowest elevations (> 2000 ft),.....

**Northern Blue Ridge Montane Alluvial Forest
Liriodendron tulipifera – *Platanus occidentalis* – *Betula lenta* / *Lindera benzoin* / *Circaea lutetiana*
spp. canadensis Forest (CEGL006255)**

Tsuga canadensis and *Betula alleghaniensis* usually abundant; low-elevation floodplain species *Platanus occidentalis*, *Ulmus americana*, *Juglans nigra*, *Fraxinus pensylvanica*, *Carpinus caroliniana*, and *Polygonum virginianum* absent; less diverse forests of montane stream bottoms at middle elevations (> 2000 ft)

**Hemlock – Northern Hardwood Forest
Tsuga canadensis - *Betula alleghaniensis* Lower New England / Northern Piedmont Forest
(CEGL006109)**

51

Vegetation of discrete basin wetlands with seasonal ponding; *Panicum rigidulum*, *Panicum verrucosum* characteristic; *Quercus palustris* may form a sparse or open canopy; confined to low-elevation flats where the Park intersects the Shenandoah Valley.....

**Shenandoah Valley Sinkhole Pond
Quercus palustris / *Panicum rigidulum* var. *rigidulum* - *Panicum verrucosum* - *Eleocharis acicularis*
Herbaceous Vegetation (CEGL007858)**

Vegetation not associated with a discrete basin; hydrologic regime of groundwater seepage rather than seasonal flooding; *Panicum* spp. and *Quercus palustris* absent.....52

52

Small-patch, very narrow wetland within forested upland; trees absent (although shaded by adjacent upland trees) or *Betula alleghaniensis* the only tree rooted in the seep.....

**Central Appalachian Woodland Seep
Caltha palustris – *Impatiens capensis* – *Viola cucullata* Herbaceous Vegetation (CEGL006258)**

Large-patch forested swamps with water-tolerant trees and shrubs rooted in the wetland.....53

53

Tsuga canadensis and *Fraxinus* spp. usually absent; *Nyssa sylvatica* usually abundant; *Vaccinium corymbosum* or *Vaccinium fuscatum* present and characteristic; swamps on metasedimentary substrates at very low elevations (< 2000 ft).....

**Central Appalachian Acidic Seepage Swamp
Acer rubrum - *Nyssa sylvatica* / *Ilex verticillata* – *Vaccinium fuscatum* / *Osmunda cinnamomea* Forest
(CEGL007853)**

Tsuga canadensis and/or *Fraxinus* spp. often common or abundant; *Nyssa sylvatica* usually absent; *Vaccinium corymbosum* and *Vaccinium fuscatum* absent; swamps on metabasalt and granitic substrates at middle and high elevations (> 2000 ft.).....54

54

Tsuga canadensis usually absent or unimportant in overstory; *Fraxinus nigra* often important in overstory and/or understory; *Acer pensylvanicum* and *Kalmia latifolia* generally absent; *Carex bromoides*, *Carex prasina*, *Deparia acrostichoides*, and *Glyceria striata* usually present and characteristic; *Osmunda cinnamomea* and *Glyceria melicaria* usually absent or unimportant.....

**Central Appalachian Basic Seepage Swamp
Acer rubrum – *Fraxinus americana* - *Fraxinus nigra* - *Liriodendron tulipifera* / *Carex bromoides* –
Caltha palustris Forest (CEGL008416)**

Tsuga canadensis usually characteristic and important in the overstory; *Fraxinus nigra* usually absent or unimportant; *Acer pensylvanicum* and *Kalmia latifolia* often present; *Carex bromoides*, *Carex prasina*,

Deparia acrostichoides, and *Glyceria striata* usually absent; *Osmunda cinnamomea* and *Glyceria melicaria* usually abundant.....**High-Elevation Hemlock – Yellow Birch Seepage Swamp**
Tsuga canadensis - *Betula alleghaniensis* / *Veratrum viride* – *Carex scabrata* – *Oclemena acuminata*
Forest (CEGL008533)

NON-FORESTED WETLANDS

55

Herbaceous vegetation of discrete basin wetlands with seasonal ponding; *Panicum rigidulum*, *Panicum verrucosum* characteristic; *Quercus palustris* and/or shrubs may occur on the periphery; confined to low-elevation flats where the Park intersects the Shenandoah Valley.....**Shenandoah Valley Sinkhole Pond**

Quercus palustris / *Panicum rigidulum* var. *rigidulum* - *Panicum verrucosum* - *Eleocharis acicularis*
Herbaceous Vegetation (CEGL007858)

Vegetation not associated with a discrete basin; hydrologic regime of groundwater seepage rather than seasonal flooding; *Panicum* spp. and *Quercus palustris* absent.....56

56

Shrubs, if present, characterized by *Lindera benzoin*; forbs such as *Chelone glabra*, *Chrysosplenium americanum*, and *Caltha palustris* characteristic of the herb layer; graminoids absent or sparse; widely but locally distributed in Park.....**Central Appalachian Woodland Seep**

Caltha palustris – *Impatiens capensis* – *Viola cucullata* **Herbaceous Vegetation (CEGL006258)**

Shrub layer patchy to well-developed, characterized by *Cornus racemosa*, *Spiraea alba* var. *latifolia*, and/or *Lyonia ligustrina*; *Lindera benzoin* absent; herb layer characterized by the forb *Sanguisorba canadensis* and large graminoid patches of *Calamagrostis canadensis*, *Carex scoparia*, *Carex buxbaumii*, and *Glyceria striata*; *Chelone glabra* and *Chrysosplenium americanum* absent; confined to high-elevation streamheads over metabasalt.....**Northern Blue Ridge Mafic Fen**

Spiraea alba var. *latifolia* – *Cornus racemosa* / *Calamagrostis canadensis* – *Sanguisorba canadensis* – *Carex scoparia* **Shrubland (CEGL006249)**

LIST OF INDICATOR SPECIES FOR VEGETATION CLASSES CITED IN THE KEY

Xerophytic species:

Carex pensylvanica, *Cunila origanoides*, *Danthonia spicata*, *Dichanthelium boscii*, *Dichanthelium linearifolium*, *Elymus hystrix* var. *hystrix*, *Eupatorium sessilifolium*, *Helianthus divaricatus*, *Hieracium venosum*, *Houstonia longifolia*, *Ionactis linariifolius*, *Lespedeza procumbens*, *Muhlenbergia sobolifera*, *Pteridium aquilinum* var. *latiusculum*, *Pycnanthemum incanum*, *Rosa carolina*, *Solidago bicolor*, *Solidago ulmifolia* var. *ulmifolia*

Dry-mesophytic species:

Amphicarpaea bracteata, *Asclepias quadrifolia*, *Brachyelytrum erectum*, *Circaea lutetiana* ssp. *canadensis*, *Desmodium nudiflorum*, *Dichanthelium latifolium*, *Dioscorea quaternata*, *Eurybia macrophylla*, *Festuca subverticillata*, *Galium circaezans*, *Galium latifolium*, *Galium triflorum*, *Hepatica americana*, *Phryma leptostachya*, *Polystichum acrostichoides*, *Scrophularia lanceolata*, *Silene stellata*, *Solidago caesia*, *Solidago curtisii*, *Stellaria pubera*, *Uvularia perfoliata*

[NOTE: *Actaea racemosa* and *Ageratina altissima* are considered characteristic of BOTH the dry-mesophytic and mesophytic classes]

Mesophytic / nutrient-requiring species:

Aconitum reclinatum, *Agastache scrophulariaefolia*, *Angelica triquinata*, *Arisaema triphyllum*, *Asarum canadense*, *Asclepias exaltata*, *Caulophyllum thalictroides*, *Deparia acrostichoides*, *Hydrophyllum virginianum*, *Impatiens pallida*, *Laportea canadensis*, *Monarda clinopodia*, *Osmorhiza claytonii*, *Polymnia canadensis*, *Thalictrum coriaceum*, *Trillium grandiflorum*, *Viola canadensis*

High-elevation lithophytic species:

Carex brunnescens var. *sphaerostachya*, *Carex aestivalis*, *Polypodium appalachianum*, *Hylotelephium telephioides*, *Heuchera pubescens*, *Rubus idaeus* ssp. *strigosus*

Low-elevation lithophytic species:

Aster oblongifolius, *Bouteloua curtipendula*, *Cheilanthes lanosa*, *Cyperus lupulinus*, *Isanthus brachiatus*, *Muhlenbergia capillaris* var. *capillaris*, *Oligoneuron rigidum* ssp. *rigidum*, *Panicum philadelphicum*, *Polygonum tenue*, *Sorghastrum nutans*, *Sporobolus clandestinus*, *Sporobolus vaginiflorus*, *Talinum teretifolium*