

II. FIELD KEYS

KEYS TO VEGETATION OF CADES COVE AND MOUNT LE CONTE QUADRANGLES, GREAT SMOKY MOUNTAINS NATIONAL PARK

- 1 Wetland (palustrine) communities: Wetland habitats either dominated by plants adapted to anaerobic conditions imposed by substrate saturation or inundation during 10% or more of the growing season, or non-vegetated with saturated or shallowly inundated substrate **Key A**

- 1 Upland communities: Upland habitats either dominated by plants which are not adapted to anaerobic soils conditions imposed by saturation or inundation for more than 10% of the growing season, or non-vegetated with substrate that is not flooded or saturated
 - 2 Communities at greater than 4000 feet elevation (characteristic of high elevation landscapes, generally above 4000 feet -- communities of intermediate, ambiguous character keyed in both leads).
 - 3 Nonforested communities (trees generally have less than 25% canopy coverage) **Key B**

 - 3 Forested communities (tree canopy coverage greater than 25%), dominated by species such as *Abies fraseri*, *Picea rubens*, *Betula alleghaniensis*, *Aesculus flava*, *Fagus grandifolia*, *Quercus rubra*.
 - 4 Evergreen Forests and Woodlands -- stands with canopies dominated by evergreen trees (greater than 75% of the total tree cover) **Key C**

 - 4 Deciduous or Mixed Forests and Woodlands -- stands with less than 25% of the canopy coverage comprised of evergreen trees **Key D**

 - 2 Communities at less than 4000 feet elevation (characteristic of low to intermediate elevation landscapes, generally below 4000 feet -- communities of intermediate, ambiguous character keyed in both leads).
 - 5 Nonforested communities (trees generally have less than 25% canopy coverage) **Key E**

 - 5 Forested communities (tree canopy coverage greater than 25%).
 - 6 Vegetation strongly altered by recent human disturbance, dominated by alien species (*Paulownia tomentosa* or *Ailanthus altissima*) or certain, disturbance-oriented native species, often in monospecific stands (*Pinus virginiana*, *Liriodendron tulipifera*, *Acer rubrum*, *Robinia pseudoacacia*, *Juglans nigra*). **Key F**

 - 6 Vegetation natural or relatively unaltered by recent disturbance, dominated by native species, usually in more diverse combinations (if with monospecific canopy, not generally of the above species, except *Pinus virginiana*).
 - 7 Stands in exposed topographic positions; ridges and upper slopes. Dominated by species such as *Pinus pungens*, *Pinus rigida*, *Pinus virginiana*, *Pinus echinata*, *Pinus strobus*, *Quercus prinus*, *Quercus coccinea*.
 - 8 Evergreen-dominated **Key G**

 - 8 Deciduous or mixed (evergreen and deciduous) dominated **Key H**

 - 7 Stands in protected (sheltered) topographic positions; coves and lower slopes. Dominated by species such as *Tsuga canadensis*, *Halesia tetraptera*, *Liriodendron tulipifera*, *Tilia americana* var. *heterophylla*, *Fraxinus americana*, *Quercus alba*, *Quercus rubra*, *Quercus prinus*, *Acer saccharum*.
 - 9 Evergreen Forests and Woodlands: Stands with canopies dominated by evergreen trees (greater than 75% of the total tree cover) **Key I**

 - 9 Deciduous or Mixed Forests and Woodlands: Stands with less than 25% of the canopy coverage comprised of evergreen trees **Key J**

DRAFT KEY TO THE VEGETATION OF THE CADES COVE AND MOUNT LE CONTE QUADRANGLES, GREAT SMOKY MOUNTAINS NATIONAL PARK - For use with International Vegetation Classification of Ecological Communities: Great Smoky Mountains National Park subset (4/99)

Items in brackets were not observed or sampled on the pilot quadrangles, but are likely in the Park

Key A -- wetland (palustrine) communities

- 1 Non alluvial: Vegetation is seepage-fed (though often in close proximity to or originating with small streams), rarely if ever flooded by alluvial waters [SPHAGNUM AND SHRUB BOGS AND SEEPS; FORESTED SEEPS; UPLAND POOLS; SPRAY CLIFFS]
- 2 Tree dominated vegetation in seasonally flooded upland depressions; water ponding to significant depths at least in winter season and following rainfall events; dominant or associated trees *Liquidambar styraciflua* or *Acer rubrum* var. *trilobum*.
.....*Liquidambar styraciflua* / *Sphagnum* spp. Forest – (CEGL007388)
- 2 Open, herb dominated vegetation with few trees, but may be shaded by overhanging canopies; water rarely ponding to depths greater than a few centimeters; trees (if present) generally *Picea rubens*, *Betula alleghaniensis*, *Aesculus flava*, *Tilia americana* var. *heterophylla*, and/or *Fagus grandifolia*.
- 3 Saturated vegetation associated with cliffs (vertical, overhanging, or very steep) in the spray zone of waterfalls, with little soil substrate; often dominated by mosses and liverworts, with very variable cover of vascular plants.
.....*Vittaria appalachiana* - *Heuchera parviflora* var. *parviflora* - *Houstonia serpyllifolia* / *Plagiochila* spp. Herbaceous Vegetation – (CEGL004302)
- 3 Herbaceous seeps dominated by graminoids or forbs in nearly level to moderately sloping seepages.
 - 4 Vegetation dominated by *Juncus effusus*; at low elevations in disturbed (usually unforested) landscapes.....
.....*Juncus effusus* Seasonally Flooded Herbaceous Vegetation – (CEGL004112)
 - 4 Vegetation dominated by other species; at higher elevations, in more natural landscapes, and often with overhanging trees; occurring at over higher elevations in natural contexts.
 - 5 Vegetation dominated by graminoid species, especially *Calamagrostis cainii*, *Carex ruthii*, *Carex gynandra*, *Carex atlantica*, and other *Carex* species; occurring at over 5,000 feet elevation and surrounded by, or formerly surrounded by, forests with *Picea rubens* and *Abies fraseri*.
 - 6 High elevation herbaceous seepage slope dominated by *Calamagrostis cainii*
.....*Calamagrostis cainii* – *Carex ruthii* – *Parnassia asarifolia* / *Sphagnum* spp. Herbaceous Vegetation – (CEGL007877)
 - 6 High elevation herbaceous seep dominated by a mix of *Carex* spp. (*Carex ruthii*, *Carex gynandra*, *Carex crinita*), well-developed *Sphagnum* mats, and forbs such as *Chelone* spp.
.....*Carex gynandra* - *Platanthera clavellata* - *Drosera rotundifolia* - *Carex ruthii* - *Carex atlantica* / *Sphagnum* spp. Herbaceous Vegetation – (CEGL007697)
 - 5 Vegetation dominated by forbs such as *Diphylleia*, *Impatiens*, *Saxifraga*, *Rudbeckia*, and/or *Monarda*, occurring as inclusions in an otherwise forested landscape; occurring at below 5,000 feet elevation and surrounded by, or formerly surrounded by, hardwood forests dominated by *Aesculus flava*, *Tilia americana* var. *heterophylla*, *Liriodendron tulipifera*, *Betula alleghaniensis*, *Fagus grandifolia*, and *Acer saccharum*.
 - 7 Forb dominated, shaded seep, at low elevations (below 4,000 feet) with *Diphylleia cymosa* and/or *Saxifraga micranthidifolia*, occurring within forests dominated by *Aesculus flava*, *Tilia americana* var. *heterophylla*, *Liriodendron tulipifera*, and *Acer saccharum*.....
Diphylleia cymosa - *Saxifraga micranthidifolia* - *Laportea canadensis* Herbaceous Vegetation – (CEGL004296)
 - [7] Forb dominated shaded seep, at high elevations (above 4,000 feet), with *Impatiens capensis*, *Impatiens pallida*, *Monarda didyma*, *Rudbeckia laciniata* var. *humilis*, occurring on boulderfields or within forests dominated by *Betula alleghaniensis*, *Aesculus flava*, and *Fagus grandifolia*
[*Impatiens (capensis, pallida)* - *Monarda didyma* - *Rudbeckia laciniata* var. *humilis* Herbaceous Vegetation] – (CEGL004293)
- 1 Alluvial: Vegetation associated with the banks or channels of rivers and streams, receiving, at least, occasional flooding. [MONTANE ALLUVIAL FORESTS; RIVER GRAVEL / COBBLE BAR; UNFORESTED FLOODPLAIN CANEBRAKE]
- 8 Tree dominated; vegetation with tree canopy coverage greater than 25%.
 - 9 Canopy dominated by *Acer rubrum*, occurring with other deciduous trees, on seasonally flooded, disturbed flats near streams.
.....*Acer rubrum* Seasonally Flooded Forest (CEGL006347)
 - 9 Canopy dominated by *Liquidambar styraciflua*, *Liriodendron tulipifera*, *Platanus occidentalis*, *Betula alleghaniensis*, *Betula lenta*, *Acer negundo* var. *negundo*, *Acer rubrum* var. *trilobum*, or *Quercus imbricaria*; hydrology is temporarily flooded (surface water present for brief periods during the growing season, but water table is usually well below the soil surface).
 - 10 Canopy composed of combinations of *Platanus occidentalis*, *Acer negundo* var. *negundo*, *Acer rubrum* var. *trilobum*, *Liriodendron tulipifera*, and *Quercus imbricaria*; occurring along small streams in a landscape of pastures and fields in Cades Cove
.....*Platanus occidentalis* - *Fraxinus pennsylvanica* - *Acer negundo* / *Boehmeria cylindrica* Forest – (CEGL007339)
 - 10 Canopy variously dominated by dominated by *Liquidambar styraciflua*, *Liriodendron tulipifera*, *Platanus occidentalis*, *Betula alleghaniensis*, or *Betula lenta*; sites are alluvial flats and high terraces along large rivers, small, disturbed flats along medium-sized perennial streams, or narrow, rocky floodplains and islands in medium-sized rivers, at elevations below 2000 feet.

DRAFT KEY TO THE VEGETATION OF THE CADES COVE AND MOUNT LE CONTE QUADRANGLES, GREAT SMOKY MOUNTAINS NATIONAL PARK - For use with International Vegetation Classification of Ecological Communities: Great Smoky Mountains National Park subset (4/99)

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- 11 Canopy is dominated by *Liquidambar styraciflua* and *Liriodendron tulipifera*, often with *Platanus occidentalis*; *Carpinus caroliniana* is characteristic; sites are large alluvial flats and high terraces along large rivers (e.g. Little Pigeon River) or on small, disturbed flats along medium-sized perennial streams, often areas that were formerly cleared for farming or settlement.
Liquidambar styraciflua - Liriodendron tulipifera (Platanus occidentalis) / Carpinus caroliniana - Halesia tetraptera var. monticola / Amphicarpaea bracteata Forest - (CEGL007880)
- [11] Canopy dominated by *Platanus occidentalis*, *Liriodendron tulipifera*, *Liquidambar styraciflua*, *Betula alleghaniensis*, and *Betula lenta*; shrub stratum can be dense; characteristic shrubs are *Leucothoe fontanesiana*, *Rhododendron maximum*, *Alnus serrulata*, *Xanthorhiza simplicissima*, *Hydrangea arborescens*; sites are narrow, rocky floodplains and islands in medium-sized rivers, at elevations below 2000 feet.
..... **[*Platanus occidentalis - Liriodendron tulipifera - Betula (alleghaniensis, lenta) / Alnus serrulata - Leucothoe fontanesiana Forest*] - (CEGL004691)**
- 8 Not tree dominated, open vegetation with less than 25 % tree canopy coverage.
- 12 Vegetation dominated by herbs; with little or no woody coverage; dominated by *Carex torta*, forming dense, extensive colonies.
..... ***Carex torta Herbaceous Vegetation - (CEGL004103)***
- 12 Vegetation dominated by shrubs (including bamboo); hydrology is seasonally to temporarily flooded.
- 13 Vegetation dominated by dense, monospecific stand of *Arundinaria gigantea*.
..... ***Arundinaria gigantea ssp. gigantea Shrubland - (CEGL003836)***
- [13] Vegetation dominated shrubs characteristic of rocky or gravelly substrates along narrow river margins; common shrubs include *Alnus serrulata*, *Xanthorhiza simplicissima*, *Salix (nigra, sericea)*, *Leucothoe fontanesiana*, *Itea virginica*, *Viburnum nudum var. cassinoides*. **[*Alnus serrulata - Xanthorhiza simplicissima Shrubland*] - (CEGL003895)**

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**Key B -- high elevation, nonforested, terrestrial communities
[Grass Balds, Heath Balds, Rocky Summits]**

- 1 Nonforested vegetation supported by significant soil substrate without large areas of exposed rock; shrubs, if present, are primarily deciduous
 - 2 Vegetation is mainly graminoid dominated; with local dominance by shrubs; sites are gentle, broad ridges; *Danthonia compressa* is the common grass; *Rhododendron calenulaceum* and *Vaccinium corymbosum* are common shrubs.
..... ***Danthonia compressa* Herbaceous Vegetation – (CEGL004242)**
 - 2 Successional vegetation resulting from the death of *Abies fraseri*; vegetation is variously dominated by dense shrubs (*Rubus canadensis*, *Diervilla sessilifolia*) or dense forbs (*Athyrium filix-femina*, *Solidago glomerata*); standing dead trees are common
..... ***Rubus canadensis* - (*Rubus idaeus* ssp. *strigosus*) / *Athyrium filix-femina* - *Solidago glomerata* Shrubland – (CEGL003893)**
- 1 Nonforested vegetation associated with rock outcroppings; vegetation is rooted in crevices or within shallow organic accumulations.
 - 3 Dense shrub thickets sometimes with inclusions of bare rock; shrubs are predominantly evergreen, although deciduous species may be locally dominant.
 - 4 Dense shrub thickets one to four meters tall; mostly evergreen, but may have local dominance by deciduous shrubs. Dominant shrubs are *Kalmia latifolia*, *Rhododendron catawbiense*, *Gaylussacia baccata*, *Pieris floribunda*, or *Vaccinium corymbosum*; sites are southerly exposed ridges and steep slopes typically below 5,000 feet elevation
***Kalmia latifolia* - *Rhododendron catawbiense* – (*Gaylussacia baccata*, *Pieris floribunda*, *Vaccinium corymbosum*) Shrubland – (CEGL003814)**
 - 4 Open to dense shrub dominated vegetation 0.5 to four meters tall. Dominant shrubs include *Rhododendron carolinianum*, *Rhododendron catawbiense*, and *Leiophyllum buxifolium*; sites are typically above 5000 feet elevation, in the Spruce-Fir zone. ..
..... ***Rhododendron carolinianum* - *Rhododendron catawbiense* - *Leiophyllum buxifolium* Shrubland – (CEGL007876)**
 - 3 Sparse to moderate vegetation coverage on landslide scars, cliffs, rock outcrops; vegetation is comprised of grasses, forbs and shrubs rooted in rock fissures; characteristic species include *Calamagrostis cainii*, *Carex misera*, *Carex debilis*, *Saxifraga michauxii*, *Solidago glomerata*, *Rhododendron carolinianum*, *Leiophyllum buxifolium*, *Abies fraseri*.....
..... ***Saxifraga michauxii* - *Carex misera* - *Calamagrostis cainii* Herbaceous Vegetation – (CEGL004278)**

**Key C -- high elevation, terrestrial evergreen forests and woodlands
[Spruce / Fir Forests, Table Mountain Pine Woodlands]**

- 1 Stands dominated by *Abies fraseri*, *Picea rubens*, or *Tsuga canadensis*.
 - 2 The most abundant trees are *Abies fraseri*.
 - 3 Shrub strata are relatively open and composed of deciduous species, although *Abies fraseri* regeneration may be dense in patches; common shrubs include *Betula alleghaniensis*, *Prunus pennsylvanica*, *Sorbus americana*, *Diervilla sessilifolia*, *Rubus canadensis*, *Sambucus racemosa* var. *pubens*, *Vaccinium erythrocarpum*, *Viburnum lantanoides*.
..... ***Abies fraseri* / *Viburnum lantanoides* / *Dryopteris campyloptera* - *Oxalis montana* / *Hylocomium splendens* Forest – (CEGL006049)**
 - [3] Shrub strata are dense and dominated by evergreen ericads (*Rhododendron catawbiense*, *Rhododendron carolinianum*, *Rhododendron maximum*); sites are rocky, steep ridges and exposed south facing slopes over 6,000 feet elevation
..... **[*Abies fraseri* / (*Rhododendron catawbiense*, *Rhododendron carolinianum*) Forest] – (CEGL006308)**
 - 2 The most abundant trees are *Picea rubens*, with or without *Abies fraseri* or *Tsuga canadensis*.
 - 4 Canopy dominated by *Picea rubens* and *Tsuga canadensis*.
..... ***Picea rubens* - *Tsuga canadensis* / *Rhododendron maximum* Forest – (CEGL006272)**
 - 4 Canopy dominated by *Picea rubens* and sometimes codominated with *Abies fraseri* or standing dead *Abies fraseri*.
 - 5 Shrub strata are dense; herbaceous coverage is low; dominant shrubs are evergreen ericads, most commonly *Rhododendron catawbiense* and *Leucothoe fontanesiana*; shrub stratum may also include dense patches of *Abies fraseri* seedlings and saplings.
.. ***Picea rubens* - (*Abies fraseri*) / (*Rhododendron catawbiense*, *Rhododendron maximum*) Forest – (CEGL007130)**
 - 5 Shrub strata are absent to dense, but dominated by deciduous shrubs and patches of *Abies fraseri* and *Picea rubens* regeneration; common shrubs include *Rubus canadensis*, *Vaccinium erythrocarpum*, *Diervilla sessilifolia*, *Sorbus americana*, *Prunus pennsylvanica*; bryophyte cover may be high; typical herbs include *Aster acuminatus*, *Athyrium asplenioides*, *Oxalis montana*.....
..... ***Picea rubens* - (*Abies fraseri*) / *Vaccinium erythrocarpum* / *Oxalis montana* - *Dryopteris campyloptera* / *Hylocomium splendens* Forest – (CEGL007131)**
 - 1 Stands dominated by *Pinus pungens*; canopy is dominated by *Pinus pungens* with dense shrub strata and sparse herbaceous coverage; commonshrubs are *Pieris floribunda*, *Kalmia latifolia*, *Gaylussacia baccata*, *Vaccinium pallidum*; other typical species are *Galax urceolata*, *Gaultheria procumbens*, and *Smilax rotundifolia*; sites are exposed slopes and ridges
..... ***Pinus pungens* – *Pinus rigida* (*Quercus prinus*) / *Kalmia latifolia* - *Vaccinium pallidum* Woodland – (CEGL007097)**

**Key D -- high elevation, terrestrial deciduous and mixed forests and woodlands
[Boulderfield Forests, Beech Gaps, High Elevation Red Oak, Northern Hardwood Forests]**

- 1 Canopy composed of a mix of evergreen and deciduous trees; dominant species are *Picea rubens*, *Betula alleghaniensis*, and *Tsuga canadensis*; evergreen trees may overtop deciduous trees in the canopy.
- 2 Canopy dominated by *Picea rubens* and deciduous trees, *Betula alleghaniensis*, *Fagus grandifolia*, *Aesculus flava*, *Prunus pensylvanica*.
 - 3 Shrub strata are dense and dominated by evergreen ericads (*Rhododendron maximum*, *Leucothoe fontanesiana*) although deciduous shrubs may be present (e.g. *Ilex montana*); herbaceous cover is sparse; bryophyte cover may be high (greater than 50%).....
..... ***Picea rubens* - (*Betula alleghaniensis*, *Aesculus flava*) / *Rhododendron (maximum, catawbiense)* Forest – (CEGL004983)**
 - 3 Shrub strata are sparse to dense (20-90% coverage) and dominated by deciduous species; common shrubs are *Acer spicatum*, *Vaccinium erythrocarpum*, *Viburnum lantanoides*, *Sorbus americana*, and *Rubus canadensis*; herbaceous cover is moderate to dense (30-90% coverage); typical herbs are *Dryopteris campyloptera*, *Oxalis montana*, *Solidago glomerata*, *Clintonia borealis*, and *Rugelia nudicaulis*, *Athyrium filix-femina*, *Huperzia lucidula*.....
..... ***Picea rubens* - (*Betula alleghaniensis*, *Aesculus flava*) / *Viburnum lantanoides* / *Oxalis montana* - *Solidago glomerata* Forest – (CEGL006256)**
- 2 Canopy dominated by *Tsuga canadensis* and *Betula alleghaniensis* with a dense evergreen shrub stratum and sparse herb coverage.....
..... ***Tsuga canadensis* – *Betula alleghaniensis* / *Rhododendron maximum* / *Leucothoe fontanesiana* Forest – (CEGL007861)**
- 1 Canopy dominated by deciduous trees
 - 4 Canopy dominated by *Quercus* spp.
 - 5 Canopy strongly dominated by *Quercus alba*.....[***Quercus alba* / *Kalmia latifolia* Forest**]-**(CEGL007295)**
 - 5 Canopy strongly dominated by *Quercus rubra*, although *Quercus alba* may be present
 - 6 Shrub stratum is dense and dominated by evergreen ericads (e.g. *Kalmia latifolia*, *Rhododendron catawbiense*, *Rhododendron maximum*); herbaceous cover is sparse.....
..... ***Quercus rubra* / (*Kalmia latifolia*, *Rhododendron maximum*) / *Galax urceolata* Forest – (CEGL007299)**
 - 6 Shrub strata are sparse to dense and dominated by deciduous species (e.g. *Ilex montana*, *Rhododendron calendulaceum*, *Vaccinium corymbosum*); herbaceous cover is moderate to dense and dominated by ferns, tall forbs, and sedges.
 - 7 Shrub stratum is absent or very sparse and herb coverage is dense, approaching 100 % and dominated by *Carex* spp., although ferns and tall forbs may be present.....
..... ***Quercus rubra* / *Carex pensylvanica* - *Ageratina altissima* var. *roanensis* Forest – (CEGL007298)**
 - 7 Shrub stratum is moderate to dense and dominated by deciduous species (e.g. *Ilex montana*, *Rhododendron calendulaceum*, *Vaccinium corymbosum*); herbaceous cover is moderate to dense and dominated by ferns, tall forbs, and sedges; common species are *Dennstaedtia punctilobula*, *Thelypteris noveboracensis*, *Ageratina altissima* var. *roanensis*, *Clintonia umbellulata*, *Silene stellata*, *Solidago caesia* var. *curtisii*.....
..... ***Quercus rubra* / (*Vaccinium simulatum*, *Rhododendron calendulaceum*) / (*Dennstaedtia punctilobula*, *Thelypteris noveboracensis*) Forest – (CEGL007300)**
 - 4 Canopy not dominated by Oaks (*Quercus* spp.), but other broad leaved deciduous species (*Betula alleghaniensis*, *Fagus grandifolia*, *Aesculus flava*, *Acer saccharum*).
 - 8 Substrate is bouldery talus of periglacial boulderfields; with limited soil development; often associated with small creeks and seepage; vines and shrubs associated with bouldery habitats are well represented; characteristic species are *Ribes* spp., *Acer spicatum*, *Hydrangea arborescens*, *Euonymus obovata*.
 - 9 Canopy is stunted and strongly dominated by *Betula alleghaniensis*; other canopy species can include *Aesculus flava*, *Prunus pensylvanica*, *Sorbus americana*, *Acer spicatum*, and *Picea rubens*; associated species are characteristic of high elevations (*Diervilla sessilifolia*, *Dryopteris campyloptera*, *Ribes glandulosum*, *Rugelia nudicaulis*, *Streptopus amplexifolius*); site is exposed, generally over 5,000 feet elevation.....
..... ***Betula alleghaniensis* / *Ribes glandulosum* / *Polypodium appalachianum* Forest – (CEGL006124)**
 - 9 Canopy is dominated by *Betula alleghaniensis* or *Aesculus flava*; other canopy species can include *Betula lenta*, *Tilia americana* var. *heterophylla*; common shrubs are *Acer spicatum*, *Hydrangea arborescens*, *Euonymus obovata*, *Ribes rotundifolium*, *Ribes cynosbati*; sites are generally below 5,000 feet elevation.....
..... ***Betula alleghaniensis* / *Acer spicatum* / *Hydrangea arborescens* - *Ribes cynosbati* / *Dryopteris marginalis* Forest – (CEGL004982)**
 - 8 Substrate is relatively well developed soils, although soils may be rocky; species characteristic of bouldery habitats are not common.
 - 10 Canopy strongly dominated by short stature *Fagus grandifolia*; sites are upper slopes, gaps, and ridges.
 - 11 Herbaceous cover is strongly dominated by *Carex* spp. (e.g. *Carex aestivalis*, *Carex brunnescens*, *Carex debilis*, *Carex intumescens*, *Carex pensylvanica*); sites are concave slopes, flat ridgetops, or upper south to southwest-facing slopes.
..... ***Fagus grandifolia* / *Carex pensylvanica* - *Carex brunnescens* Forest – (CEGL006130)**
 - [11] Herbaceous cover is dominated by large herbs and patches of ferns, with lesser amounts of sedges; other canopy species can include *Aesculus flava* and *Betula alleghaniensis*; common species include *Ageratina altissima* var. *roanensis*, *Aster*

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chlorolepis, Athyrium filix-femina ssp. asplenioides, Dryopteris campyloptera, Phacelia bipinnatifida, Prenanthes altissima, Prenanthes roanensis, Stellaria pubera, Thelypteris noveboracensis, Trillium erectum; sites are northerly facing, steep, upper slopes and the north side of gaps.....

..... [***Fagus grandifolia / Ageratina altissima var. roanensis* Forest**] – (CEGL006246)

- 10 Canopy dominated by various combinations of *Betula alleghaniensis*, *Fagus grandifolia*, *Aesculus flava*, *Acer saccharum*.
- 12 Shrub stratum is dense and composed of evergreen ericads (*Rhododendron maximum*, *Leucothoe fontanesiana*); and herb cover is absent or sparse.....
***Tsuga canadensis – Betula alleghaniensis / Rhododendron maximum / Leucothoe fontanesiana* Forest – (CEGL007861)**
- 12 Shrub stratum is absent or has sparse to moderate coverage and dominated by deciduous species.
- 13 Canopy is dominated by *Betula alleghaniensis*, *Fagus grandifolia*, *Aesculus flava*, *Acer saccharum*, *Halesia tetraptera var. monticola*; herb cover is lush and diverse with species such as *Deparia acrostichoides*, *Viola canadensis*, *Cimicifuga americana*, *Cimicifuga racemosa*, *Deparia acrostichoides*, *Dryopteris intermedia*, *Laportea canadensis*, *Disporum lanuginosum*, *Viola canadensis*; sites are relatively protected landforms, such as upper portions of draws and coves, protected slopes, and gaps.....
***Aesculus flava – Betula alleghaniensis - Acer saccharum / Acer spicatum / Caulophyllum thalictroides – Laportea canadensis* Forest – (CEGL004973)**
- 13 Canopy is dominated by *Betula alleghaniensis*, *Fagus grandifolia*, *Aesculus flava*, occurring singly or in combination; less often with *Halesia tetraptera*, *Quercus rubra*, or *Acer saccharum*; common shrubs are *Acer spicatum*, *Viburnum lantanoides*, and *Ilex montana*; herb coverage is a mix of sedges, ferns, and forbs, typically *Ageratina altissima*, *Athyrium filix-femina ssp. asplenioides*, *Carex* spp. (e.g. *Carex debilis*, *Carex intumescens*, *Carex pensylvanica*), *Dryopteris intermedia*, *Aster divaricatus*, *Stellaria pubera*; on relatively exposed landforms, such as high, exposed slopes, ridges, and gaps, typically with northerly exposures.....
***Betula alleghaniensis - Fagus grandifolia - Aesculus flava / Viburnum lantanoides / Aster chlorolepis – Dryopteris intermedia* Forest – (CEGL007285)**

**Key E – low elevation, nonforested, terrestrial communities
[Grape Holes, Cliffs and Forested Outcrops]**

- 1 Community has large areas of exposed rock; vegetation is scattered or nearly absent; vascular plants have less than 10% cover and are rooted in cracks and on ledges; sites are vertical rock faces which may be shaded by overhanging trees.
- 2 Substrate is of felsic, metamorphic, or igneous geology; species are characteristic of dry, acidic substrates; characteristic species are *Asplenium montanum* and *Heuchera villosa*.
..... ***Asplenium montanum - Heuchera villosa* Felsic Cliff Sparse Vegetation – (CEGL004980)**
- [2] Substrate is of limestone or dolomite geology; characteristic species are calciphilic herbs such as *Asplenium ruta-muraria*, *Pellaea atropurpurea*, *Pellaea glabella* ssp. *glabella*, *Asplenium resiliens*, *Aquilegia canadensis*.
..... **[*Asplenium ruta-muraria - Pellaea atropurpurea* Sparse Vegetation] – (CEGL004476)**
- 1 Vegetation supported by significant soil substrate without large areas of exposed rock; well developed vegetation dominated by shrubs, herbs, or vines.
- 3 Graminoid dominated vegetation associated with pastures and hayfields; more-or-less cultural, though sometimes no longer actively maintained. ***Festuca* spp. Herbaceous Vegetation – (CEGL004048)**
- 3 Vine dominated vegetation resulting from disturbance by ice storms, wind, or logging; the dominant species is *Vitis aestivalis*; sites are steep north facing slopes ***Vitis aestivalis* Vine-Shrubland – (CEGL003890)**

Key F – altered / anthropogenic / cultural / semi-natural vegetation

- 1 Canopy mainly evergreen, although may contain admixtures of deciduous trees; canopy dominated by *Pinus virginiana* with other successional species (*Acer rubrum*, *Liriodendron tulipifera*, *Pinus strobus*) as well as deciduous species from the surrounding forest vegetation (*Quercus alba*, *Quercus velutina*, *Quercus coccinea*); sites are former fields, pastures, clearcuts, burned or eroded areas
.....***Pinus virginiana* Successional Forest – (CEGL002591)**

- 1 Canopy mainly deciduous, dominated by various broadleaf deciduous trees.
 - 2 Canopy dominated by the exotic species *Paulownia tomentosa* or *Ailanthus altissima*.
 - [3] Canopy dominated by *Paulownia tomentosa* [***Paulownia tomentosa* Woodland**] – (CEGL003687)

 - [3] Canopy dominated by *Ailanthus altissima* [***Ailanthus altissima* Forest**] – (CEGL007191)

 - 2 Canopy dominated by the native species *Juglans nigra*, *Liriodendron tulipifera*, *Acer rubrum*, sometimes admixed with other species.
 - 4 Canopy dominated by *Juglans nigra*; open forests on former homesites below 3000 feet elevation.
.....***Juglans nigra* / *Verbesina alternifolia* Forest – (CEGL007879)**

 - 4 Canopy dominated by *Liriodendron tulipifera*, sometimes sharing the canopy with other successional species (*Acer rubrum*, *Robinia pseudoacacia*, *Acer saccharum*, *Halesia tetraptera* var. *monticola*, *Betula lenta*); sites are low slopes and flats, typically below 3000 feet elevation and particularly in areas of heavy settlement, past logging, or past farming activities
.....***Liriodendron tulipifera* - *Acer rubrum* - *Robinia pseudoacacia* Forest – (CEGL007219)**

**Key G – low elevation terrestrial xeric evergreen forest and woodlands in exposed topographic positions
[Table Mountain Pine / Pitch Pine Woodlands, Shortleaf Pine Forests, White Pine Forests]**

- 1 Successional vegetation resulting from recent disturbance; canopy dominated by *Pinus virginiana* sometimes with other successional species; sites are former fields, pastures, clearcuts, burned, or eroded areas.....***Pinus virginiana* Successional Forest – (CEGL002591)**
- 1 Mature, relatively undisturbed vegetation; canopy variously dominated by *Pinus* spp. (including *P. virginiana*).
 - [2] Canopy dominated by *Pinus strobus*; subcanopy commonly contains *Oxydendrum arboreum*, *Acer rubrum*, *Nyssa sylvatica*, *Cornus florida*; shrubs are patchy to continuous and dominated by ericaceous species (*Gaylussacia ursina*, *Vaccinium stamineum*, *Kalmia latifolia*).....
.....**[*Pinus strobus* / *Kalmia latifolia* – (*Vaccinium stamineum*, *Gaylussacia ursina*) Forest] – (CEGL007100)**
 - 2 Canopy dominated by *Pinus virginiana*, *Pinus rigida*, *Pinus pungens*, or *Pinus echinata*.
 - 3 Stands dominated by *Pinus echinata*; may have minor coverage by *Pinus virginiana* or *Pinus rigida*.
 - [4] Closed canopy with shrub stratum dominated by ericaceous species with scattered grasses and forbs
.....**[*Pinus echinata* / *Vaccinium (pallidum, stamineum)* - *Kalmia latifolia* Forest] – (CEGL007078)**
 - [4] Open canopy with understory dominated by herbs.
.....**[*Pinus echinata* / *Schizachyrium scoparium* Appalachian Woodland – (CEGL003560)]**
 - 3 Stands dominated by *Pinus virginiana*, *Pinus rigida*, or *Pinus pungens*; may have minor coverage by *Pinus echinata*.
 - 5 Canopy dominated by *Pinus virginiana*; sometimes with lesser amounts of *Pinus rigida* or *Pinus echinata*; sites are typically below 2300 feet elevation on gentle slopes and low ridges
.....***Pinus virginiana* – *Pinus (rigida, echinata)* - (*Quercus prinus*) / *Vaccinium pallidum* Forest – (CEGL007119)**
 - 5 Canopy dominated by *Pinus pungens* or *Pinus rigida*, sites are typically above 2,000 feet elevation on exposed ridgetops and slopes with west to southeast aspects
.....***Pinus pungens* – *Pinus rigida* (*Quercus prinus*) / *Kalmia latifolia* - *Vaccinium pallidum* Woodland – (CEGL007097)**

**Key H -- low elevation terrestrial deciduous and mixed xeric forests and woodlands in exposed topographic positions
[Shortleaf Pine – Oak Forests, White Pine – Oak Forests, Chestnut Oak Forests, Shale Barrens]**

- 1 Successional vegetation resulting from recent disturbance; canopy dominated by *Pinus virginiana* with other successional species (*Acer rubrum*, *Liriodendron tulipifera*, *Pinus strobus*) as well as deciduous species from the surrounding forest vegetation (*Quercus alba*, *Quercus velutina*, *Quercus coccinea*); sites are former fields, pastures, clearcuts, burned or eroded areas
.....***Pinus virginiana* Successional Forest – (CEGL002591)**
- 1 Mature, relatively undisturbed vegetation.
 - [2] Vegetation associated with significant areas of exposed mineral substrate; sites are steep, shaley slopes
.....**[*Pinus virginiana* - *Quercus prinus* - *Quercus rubra* / *Vaccinium pallidum* - *Kalmia latifolia* Forest] – (CEGL007539)**
 - 2 Vegetation supported by significant soil substrate, without large areas of exposed rock.
 - 3 Canopy dominated by a mix of evergreen and deciduous trees; dominant species are *Pinus virginiana*, *Pinus rigida*, *Pinus pungens*, *Pinus strobus*, *Acer rubrum*, *Quercus prinus*, *Quercus coccinea*.
 - 4 Canopy dominated by *Pinus strobus*, *Quercus prinus*, *Acer rubrum*, and *Quercus coccinea*
..... ***Pinus strobus* – *Quercus (coccinea, prinus)* / (*Gaylussacia ursina* - *Vaccinium stamineum*) Forest – (CEGL007519)**
 - 4 Canopy dominated by *Pinus virginiana*, *Pinus rigida*, or *Pinus pungens* with mixes of deciduous species (e.g. *Acer rubrum*, *Quercus prinus*, *Quercus coccinea*).
 - 5 Canopy dominated by *Pinus virginiana*; sometimes with lesser amounts of *Pinus rigida* or *Pinus echinata* and with mixes of deciduous species (*Quercus prinus*, *Quercus coccinea*, *Quercus alba*, *Quercus marilandica*, *Quercus velutina*); sites are typically below 2300 feet elevation on gentle slopes and low ridges
.....***Pinus virginiana* – *Pinus (rigida, echinata)* - (*Quercus prinus*) / *Vaccinium pallidum* Forest – (CEGL007119)**
 - 5 Canopy dominated by *Pinus pungens* or *Pinus rigida*, with *Quercus prinus* or *Quercus coccinea*; evergreen trees may overtop the deciduous canopy trees; sites are typically above 2,000 feet elevation on exposed ridgetops and slopes with west to southeast aspects
.....***Pinus pungens* – *Pinus rigida (Quercus prinus)* / *Kalmia latifolia* - *Vaccinium pallidum* Woodland – (CEGL007097)**
 - 3 Canopy is dominated by deciduous species.
 - 6 Canopy dominated by *Quercus prinus*, *Quercus coccinea*, and *Acer rubrum*, occurring singly or in various combinations over a dense ericaceous shrub layer (*Kalmia latifolia*, *Gaylussacia ursina*); may have standing dead *Pinus* spp.; sites are middle to upper convex slopes and ridges with southwest and western exposures.
.....**(*Quercus prinus*, *Quercus coccinea*) / *Kalmia latifolia* / *Galax urceolata* Forest – (CEGL006271)**
 - 6 Canopy dominated by *Quercus prinus* occurring with *Quercus rubra* and/or *Acer rubrum* over dense, tall *Rhododendron maximum*; sparse herb cover; sites are very steep, northerly slopes
.....***Quercus prinus* – *Quercus rubra* / *Rhododendron maximum* / *Galax urceolata* Forest – (CEGL006286)**

**Key I -- low elevation terrestrial evergreen forest and woodlands in protected topographic positions
[Hemlock Forests]**

- 1 Successional vegetation resulting from recent disturbance; canopy dominated by *Pinus virginiana* sometimes with other successional species; sites are former fields, pastures, clearcuts, burned or eroded areas.....***Pinus virginiana* Successional Forest – (CEGL002591)**

- 1 Mature, relatively undisturbed vegetation.
 - 2 Canopy dominated by *Pinus strobus* and *Tsuga canadensis* occurring over a shrub stratum dominated by *Rhododendron maximum*; deciduous species may be present in the canopy, but make up less than 25 % of the canopy coverage.....***Pinus strobus* - *Tsuga canadensis* / *Rhododendron maximum* - *Leucothoe fontanesiana* Forest – (CEGL007102)**

 - 2 Canopy dominated by *Tsuga canadensis* occurring over a shrub stratum dominated by *Rhododendron maximum*; deciduous species may be present in the canopy, but make up less than 25 % of the canopy coverage.....***Tsuga canadensis* / *Rhododendron maximum* - *Leucothoe fontanesiana* Forest – (CEGL007136)**

**Key J -- low elevation terrestrial deciduous and mixed forest and woodlands in protected topographic positions
[Mountain Cove Forests, Montane Oak –Hickory Forests]**

- 1 Vegetation strongly altered by recent human disturbance, dominated by alien species (*Paulownia tomentosa* or *Ailanthus altissima*) or certain, disturbance-oriented native species, often in monospecific stands (*Pinus virginiana*, *Liriodendron tulipifera*, *Acer rubrum*, *Robinia pseudoacacia*, *Juglans nigra*).
 - 2 Canopy a mix of evergreen and deciduous trees; canopy dominated by *Pinus virginiana* with other successional species (*Acer rubrum*, *Liriodendron tulipifera*, *Pinus strobus*) as well as deciduous species from the surrounding forest vegetation (*Quercus alba*, *Quercus velutina*, *Quercus coccinea*); sites are former fields, pastures, clearcuts, burned or eroded areas ***Pinus virginiana* Successional Forest – (CEGL002591)**
 - 2 Canopy mainly deciduous, dominated by various broadleaf deciduous trees.
 - 3 Canopy dominated by the exotic species *Paulownia tomentosa* or *Ailanthus altissima*.
 - [4] Canopy dominated by *Paulownia tomentosa* **[*Paulownia tomentosa* Woodland] – (CEGL003687)**
 - [4] Canopy dominated by *Ailanthus altissima* **[*Ailanthus altissima* Forest] – (CEGL007191)**
 - 3 Canopy dominated by the native species *Juglans nigra*, *Liriodendron tulipifera*, *Acer rubrum*, sometimes admixed with other species.
 - 5 Canopy dominated by *Juglans nigra*; open forests on former homesites below 3000 feet ***Juglans nigra* / *Verbesina alternifolia* Forest – (CEGL007879)**
 - 5 Canopy dominated by *Liriodendron tulipifera*, sometimes sharing the canopy with other successional species (*Acer rubrum*, *Robinia pseudoacacia*, *Acer saccharum*, *Halesia tetraptera* var. *monticola*, *Betula lenta*); sites are low slopes and flats, typically below 3000 feet elevation and particularly in areas of heavy settlement, past logging, or past farming activities ***Liriodendron tulipifera* - *Acer rubrum* - *Robinia pseudoacacia* Forest – (CEGL007219)**
- 1 Mature, relatively undisturbed vegetation; vegetation natural or relatively unaltered by recent disturbance, dominated by native species, usually in diverse combinations.
 - 6 Canopy dominated by a mixture of evergreen (*Tsuga canadensis*, *Pinus strobus*) and deciduous (*Betula alleghaniensis*, *Halesia tetraptera* var. *monticola*, *Magnolia fraseri*, *Fagus grandifolia*, *Liriodendron tulipifera*, *Quercus alba*, *Carya alba*) trees.
 - [7] Canopy dominated by *Pinus strobus* and deciduous (*Quercus alba*, *Carya alba*, *Acer rubrum*) species; *Pinus strobus* may over top the deciduous trees; sites are protected ridges, middle to upper slopes, and disturbed bottoms. **[*Pinus strobus* - *Quercus alba* - (*Carya alba*) / *Gaylussacia ursina* Forest] – (CEGL007517)**
 - 7 Canopy dominated by *Tsuga canadensis* with deciduous species (*Betula alleghaniensis*, *Betula lenta*, *Halesia tetraptera* var. *monticola*, *Magnolia fraseri*, *Fagus grandifolia*, *Liriodendron tulipifera*).
 - 8 (1 of 3 leads) Canopy dominated by *Tsuga canadensis* and *Betula alleghaniensis* with a dense evergreen shrub stratum and sparse herb coverage; sites are above 3000 feet elevation, on steep, mostly north-facing slopes, and on slopes and flats along and above streams ***Tsuga canadensis* – *Betula alleghaniensis* / *Rhododendron maximum* / *Leucothoe fontanesiana* Forest – (CEGL007861)**
 - 8 (2 of 3 leads) Canopy dominated by *Tsuga canadensis* and *Halesia tetraptera* var. *monticola*; other canopy species can include *Acer saccharum*, *Fagus grandifolia*, *Magnolia fraseri*, *Betula alleghaniensis*, and *Acer rubrum*; the evergreen canopy may overtop the deciduous trees or occur beneath the deciduous canopy; the shrub stratum is either dense, tall *Rhododendron maximum* or open and dominated by canopy saplings or *Acer pensylvanicum*; the herb stratum has moderate coverage; common species are *Aster divaricatus*, *Dryopteris intermedia*, *Huperzia lucidula*, *Medeola virginiana*, *Mitchella repens*, *Oxalis montana*, *Solidago caesia* var. *curtisii*, *Tiarella cordifolia*, and *Viola blanda*; sites are protected slopes and coves, typically above 3,000 feet elevation, but may extend to lower elevations. **...*Tsuga canadensis* – *Halesia tetraptera* - (*Magnolia fraseri*, *Fagus grandifolia*) / *Rhododendron maximum* / *Dryopteris intermedia* Forest – (CEGL007693)**
 - 8 (3 of 3 leads) Canopy is dominated by *Tsuga canadensis*, occurring with *Liriodendron tulipifera*, *Betula lenta*, and/or *Acer rubrum*; the shrub stratum has scattered to dominant *Rhododendron maximum*; other characteristic species are *Euonymus americanus*, *Ilex opaca*, *Leucothoe fontanesiana*, *Mitchella repens*, *Polystichum acrostichoides*; sites are low slopes and flats, is often associated with small streams, mostly below 3000 feet elevation. **....*Tsuga canadensis* – *Liriodendron tulipifera* / *Rhododendron maximum* / *Tiarella cordifolia* Forest – (CEGL007543)**
 - 6 Canopy mainly dominated by deciduous trees (less than 25% evergreen coverage in the canopy).
 - 9 Canopy dominated by Oaks (*Quercus* spp.) sometimes codominating with *Carya* spp.
 - 10 Canopy dominated by *Quercus alba* or *Quercus rubra*.
 - 11 Canopy mainly to strongly dominated by *Quercus rubra*, sites are intermediately exposed slopes, sheltered slopes, and steep coves.
 - 12 Canopy is strongly dominated by *Quercus rubra* and *Acer rubrum*; *Carya* spp. may be present but do not dominate; other canopy species may include *Liriodendron tulipifera*, *Quercus prinus*; shrub strata are well-developed and may be quite dense; common shrubs are *Gaylussacia ursina*, *Castanea dentata*, *Calycanthus floridus*, *Pyrularia pubera*,

DRAFT KEY TO THE VEGETATION OF THE CADES COVE AND MOUNT LE CONTE QUADRANGLES, GREAT SMOKY MOUNTAINS NATIONAL PARK - For use with International Vegetation Classification of Ecological Communities: Great Smoky Mountains National Park subset (4/99)

Items in brackets were not observed or sampled on the pilot quadrangles, but are likely in the Park

- Rhododendron calendulaceum*; *Tsuga canadensis* saplings often have moderate coverage in the shrub stratum; herbaceous cover is sparse to moderate but species rich; sites are at intermediate elevations (between 2,000 and 4,000 feet) and on slopes of intermediate to protected exposure.....
***Quercus rubra* - *Acer rubrum* / *Calycanthus floridus* - *Pyrularia pubera* / *Thelypteris noveboracensis* Forest – (CEGL006192)**
- 12 Canopy is dominated by *Quercus rubra*; *Quercus rubra* may be the sole canopy tree or occur with lesser amounts of *Tilia americana* var. *heterophylla*, *Halesia tetraptera* var. *monticola*, *Acer saccharum*, or *Liriodendron tulipifera*; herbs are sparse to moderate in coverage and characteristic of rich forests in cove landforms; characteristic species include *Collinsonia canadensis*, *Actaea pachypoda*, *Caulophyllum thalictroides*, *Laportea canadensis*, *Maianthemum racemosum*, *Phegopteris hexagonoptera*, *Tradescantia subaspera*; sites are protected steep slopes, often rocky; below 4,000 feet elevation.....
***Quercus rubra* - *Tilia americana* var. *heterophylla* - *Halesia tetraptera* var. *monticola* / *Collinsonia canadensis* - *Tradescantia subaspera* Forest – (CEGL007878)**
- 11 Canopy dominated by *Quercus alba* or by *Quercus alba* and *Quercus rubra* codominating.
- 13 Canopy and subcanopy dominated by *Quercus alba*, with *Carya glabra* and *Acer rubrum*; *Carya alba* can share canopy dominance at low elevations (below 2500 feet), *Quercus rubra* often codominates at the highest elevations (over 3800 feet); associated species are typical of montane acidic forests; indicators of circumneutral soils are lacking.....
***Quercus alba* - *Quercus (rubra, prinus)* / *Rhododendron calendulaceum* - *Kalmia latifolia* - (*Gaylussacia ursina*) Forest – (CEGL007230)**
- [13] Canopy dominated by *Quercus alba*, occurring with other *Quercus spp.* and *Carya spp.*; occasionally with typical “cove” species (e.g. *Fraxinus americana* or *Magnolia acuminata*); heath species (*Rhododendron maximum* or *Kalmia latifolia*) are absent or very minor in the shrub stratum; herbaceous stratum can be quite diverse and is characterized by mesic herbs and species associated with circumneutral soils; characteristic species are *Podophyllum peltatum*, *Arisaema triphyllum*, *Amphicarpaea bracteata*, *Adiantum pedatum*, *Collinsonia canadensis*, *Cimicifuga racemosa*, *Caulophyllum thalictroides*, *Sanguinaria canadensis*.....
[*Quercus alba* - *Quercus rubra* - *Quercus prinus* / *Collinsonia canadensis* - *Podophyllum peltatum* - *Sanguinaria canadensis* Forest] – (CEGL007692)
- 10 Canopy mainly dominated by *Quercus prinus*.
- 14 Canopy dominated by *Quercus prinus* and *Acer rubrum*; occasionally *Carya glabra*, *Liriodendron tulipifera*, *Quercus velutina*; *Carya spp.* can have high coverage in the canopy or subcanopy; subcanopy is dominated by *Cornus florida*; shrub stratum is sparse, lacking dense, ericaceous cover; herbaceous cover is sparse to moderate but species rich; characteristic or dominant herbs include *Maianthemum racemosum ssp. racemosum*, *Thalictrum thalictroides*, *Desmodium nudiflorum*, *Polystichum acrostichoides*, *Thelypteris noveboracensis*.....
***Quercus prinus* - (*Quercus rubra*) - *Carya spp.* / *Oxydendrum arboreum* - *Cornus florida* Forest – (CEGL007267)**
- 14 Canopy dominated by *Quercus prinus* occurring with *Quercus rubra* and/or *Acer rubrum* over dense, tall *Rhododendron maximum*; sparse herb cover; sites are very steep, northerly slopes.....
***Quercus prinus* - *Quercus rubra* / *Rhododendron maximum* / *Galax urceolata* Forest – (CEGL006286)**
- 9 Canopy not dominated by Oaks (*Quercus spp.*), but dominated by other broad leaved deciduous species (*Acer saccharum*, *Aesculus flava*, *Betula alleghaniensis*, *Betula lenta*, *Fraxinus americana*, *Liriodendron tulipifera*, *Halesia tetraptera* var. *monticola*, *Tilia americana*).
- 15 Herb layer is absent to sparse; dense ericaceous shrub layer is dominated by *Rhododendron maximum*; canopy is dominated by *Liriodendron tulipifera* and *Betula lenta*; sites are associated with small streams, below 3,000 feet elevation.....
.... *Tsuga canadensis* - *Liriodendron tulipifera* / *Rhododendron maximum* / *Tiarella cordifolia* Forest – (CEGL007543)
- 15 Herb layer species rich, typically with high coverage; shrub layer is absent to open, lacking evergreen ericads.
- 16 Canopy with *Betula alleghaniensis* or *Fagus grandifolia* sharing dominance with *Aesculus flava*, *Acer saccharum*, *Halesia tetraptera* var. *monticola*; herb cover is lush and diverse with species such as *Deparia acrostichoides*, *Viola canadensis*, *Cimicifuga americana*, *Cimicifuga racemosa*, *Dryopteris intermedia*, *Laportea canadensis*, *Disporum lanuginosum*, *Viola canadensis*; sites upper portions of draws and coves with northerly aspects, over 3500 feet elevation.....
***Aesculus flava* - *Betula alleghaniensis* - *Acer saccharum* / *Acer spicatum* / *Caulophyllum thalictroides* - *Laportea canadensis* Forest – (CEGL004973)**
- 16 Canopy without *Betula alleghaniensis* and *Fagus grandifolia*.
- 17 Canopy is dominated either by *Acer saccharum*, *Aesculus flava*, *Fraxinus americana*, *Halesia tetraptera* var. *monticola*, or *Tilia americana*, or by various combinations of these species; herb stratum is lush and diverse; characteristic herbs include *Deparia acrostichoides*, *Disporum lanuginosum*, *Hydrophyllum canadense*, *Laportea canadensis*, *Solidago flexicaulis*, *Hepatica nobilis* var. *acuta*, *Osmorhiza claytonii*, *Aristolochia macrophylla*, *Dryopteris goldiana*, *Asarum canadense*, *Viola canadensis*; sites are steep, middle to low protected slopes and coves, mostly below 4,000 feet elevation.....
Aesculus flava* - *Acer saccharum* - (*Fraxinus americana*, *Tilia americana*) / *Hydrophyllum canadense* - *Solidago

flexicaulis Forest – (CEGL007695)

- 17 Canopy dominated by various mixtures of *Liriodendron tulipifera*, *Halesia tetraptera* var. *monticola*, *Tilia americana*, *Acer rubrum*, *Fraxinus americana*; other canopy tree can include *Acer saccharum*, *Aesculus flava*, *Betula lenta*, *Prunus serrotina*, *Tsuga canadensis*; shrub cover is sparse to moderate; herbaceous stratum is sparse to moderate, but always diverse, composed of a mix of species characteristic of high base status soils and those more typical of acidic forests; typically **lacking** strong calciphiles such as *Diplazium pycnocarpon*, *Asplenium rhizophyllum*, *Dryopteris goldiana*, *Aquilegia canadensis*, *Solidago flexicaulis*, *Deparia acrostichoides*, and *Cystopteris protrusa*; sites are on low, protected topographic positions, often near streams on gentle to moderate slopes with northerly aspects.
- Liriodendron tulipifera* - *Aesculus flava* - (*Fraxinus americana*, *Tilia americana* var. *heterophylla*) / *Cimicifuga racemosa* - *Laportea canadensis* Forest -- (CEGL007710)