

## ACIDIC COVE FOREST (HIGH ELEVATION SUBTYPE)

**Concept:** Acidic Cove Forests are low to mid elevation mesophytic mountain and foothill forests dominated by combinations of acid-tolerant trees. The High Elevation Subtype occurs at the higher elevations and has *Betula alleghaniensis* as an important component. This subtype extends up into the elevational range of Northern Hardwood Forest and is somewhat intermediate between them and Acidic Cove Forest.

**Distinguishing Features:** The High Elevation Subtype is distinguished from other subtypes by the significant presence of *Betula alleghaniensis* in the canopy. Though it occurs at higher elevations on average, it may occur as low as 3000 feet, occasionally lower, and thus substantially overlaps in elevation with the Typic Subtype as well as the Silverbell Subtype. The High Elevation Subtype is distinguished from Northern Hardwood Forest and High Elevation Birch Boulderfield Forest, which also may be dominated by *Betula alleghaniensis*, by having a shrub layer dominated by *Rhododendron maximum* or *Leucothoe fontanesiana*. It also generally contains some trees of lower elevations, such as *Liriodendron tulipifera* and *Magnolia fraseri*. The High Elevation Subtype may be distinguished from the occasional Swamp Forest–Bog Complex that has abundant *Betula alleghaniensis* by lacking opening patches with wetland species.

**Synonyms:** Synonyms: *Betula alleghaniensis* - (*Tsuga canadensis*) / *Rhododendron maximum* / (*Leucothoe fontanesiana*) Forest (CEGL007861). Montane Type (*Tsuga canadensis* - *Betula alleghaniensis* / *Rhododendron maximum* - *Acer pensylvanicum* / *Dryopteris intermedia* - *Huperzia lucidula*) (Ulrey 2002).

Ecological Systems: Southern Appalachian Northern Hardwood Forest (CES202.029).

**Sites:** The High Elevation Subtype occurs in sheltered, mesic sites such as narrow rocky gorges, steep ravines, and low gentle ridges within coves. Ulrey (2002) reported an elevation range of about 3000-4100 feet, but a few examples have been found much higher, up to around 5000 feet. This elevational range substantially overlaps that of the Silverbell Subtype, overlaps a little of the Typic Subtype's range, and extends well into the range of Northern Hardwood Forest. Lower elevation occurrences may be associated with cold air drainage from higher elevations.

**Soils:** Examples occur on a wide range of mapped soil series, primarily Typic Dystrudepts, Humic Dystrudepts, and Typic Humadepts. Soils are generally very acidic and low in base saturation and in levels of nutritive cations but are slightly less extreme than in the Typic Subtype.

**Hydrology:** Sites are well drained but mesic due to topographic sheltering and low slope position. They probably are more moist than the Typic Subtype because of the higher elevation.

**Vegetation:** The High Elevation Subtype is dominated by *Tsuga canadensis* and *Betula alleghaniensis*, sometimes in combination with *Liriodendron tulipifera*. Other frequent canopy trees include *Betula lenta*, *Acer rubrum*, *Quercus rubra*, *Fagus grandifolia*, and occasional *Tilia americana* var. *heterophylla*, *Acer saccharum*, and *Halesia tetraptera*. The understory includes *Acer pensylvanicum* and *Magnolia fraseri*, as well as canopy species. The shrub layer is generally a dense thicket of *Rhododendron maximum*. The herb layer is sparse to moderate. *Dryopteris intermedia* is the most constant and abundant species reported by Ulrey (2002), and *Huperzia*

*lucidula*, *Mitchella repens*, and *Arisaema triphyllum* are highly constant. Other frequent species include *Eurybia divaricata*, *Goodyera pubescens*, *Medeola virginica*, *Polystichum acrostichoides*, *Tiarella cordifolia*, *Trillium undulatum*, and *Viola rotundifolia*.

**Range and Abundance:** Ranked G3G4Q, but probably more appropriately ranked G3. The classification is no more uncertain than that of many communities, and this community appears to be much less common than the Typic Subtype. The High Elevation Subtype ranges throughout the higher mountains of North Carolina. The equivalent association also occurs in Tennessee, Virginia, and West Virginia. Though not reported, it could also be found in Georgia.

**Associations and Patterns:** The High Elevation Subtype occurs as small to large patches. It may grade to other subtypes of Acidic Cove Forest and potentially to Northern Hardwood Forest. It grades to various oak forests on drier slopes.

**Variation:** Two variants are recognized, but additional clarification is needed.

1. Rhododendron Variant has *Rhododendron maximum* dominant in the shrub layer.
2. Dog Hobble Variant has *Leucothoe fontanesiana* dominant in the shrub layer. Large areas are said to occur around Mount LeConte in the Great Smoky Mountains. It is unclear where, or even if, it occurs in North Carolina.

**Dynamics:** The dynamics of the High Elevation Subtype are presumably similar to those of Acidic Cove Forests and Mountain Cove Forests in general. As with the Silverbell Subtype, this subtype has had particularly severe impacts from the hemlock woolly adelgid because of its large component of *Tsuga canadensis*.

**Comments:** The High Elevation Subtype was defined by Ulrey (2002), who showed that it differs in its combination of soil fertility and elevation from other Acidic Cove Forests as well as being distinct in numerical classification and ordination. An association recognizable as High Elevation Subtype was also described by Newell (1997) in her analysis of vegetation of Joyce Kilmer-Slickrock Wilderness. It was not recognized in her similar analysis of Shining Rock Wilderness, despite similar elevations. It is not found in other local studies, which tend to classify communities more coarsely. The relationship between the High Elevation Subtype and Silverbell Subtype warrants further investigation, as the environmental and elevational differences are relatively subtle. Both share a tendency to contain some species more typical of richer sites.

*Acer rubrum* - *Betula (alleghaniensis, lenta)* - *Magnolia fraseri* / (*Rhododendron maximum*, *Kalmia latifolia*) Forest (CEGL008558) is an association that appears to represent heavily disturbed versions of all three subtypes of Acidic Cove Forest.

**Rare species:**

**References:**

Newell, C.L. 1997. Local and regional variation in the vegetation of the Southern Appalachian Mountains. Ph.D. dissertation, University of North Carolina, Chapel Hill.

Ulrey, C.J. 2002. The relationship between soil fertility and the forests of the Southern Appalachian region. Ph.D. dissertation, North Carolina State University, Raleigh.