

## HIGH ELEVATION RED OAK FOREST (STUNTED WOODLAND SUBTYPE)

**Concept:** The Stunted Woodland Subtype is a rare, poorly understood *Quercus rubra* woodland of extremely exposed narrow ridges and peaks or edges of rock outcrops, where canopy trees are notably stunted, short, and low in density. Conceptually it lies on the boundary of High Elevation Red Oak Forest and Montane Oak–Hickory Forest, with *Quercus rubra* sometimes strongly dominant and *Quercus alba* sometimes codominant. It has a dense shrub layer which is dominated by evergreen heath species but sometimes is fairly diverse.

**Distinguishing Features:** The Stunted Heath Subtype is distinguished from other subtypes of High Elevation Red Oak Forest and Montane Oak–Hickory Forest by a more open and very short canopy, less than 8 meters tall even when mature. Trees may be only 5 meters tall and may branch barely above the shrub layer canopy. Care is needed to apply this subtype only to the most extremely stunted forests, as well as to distinguish it from young forests which will develop taller stature over time. Examples of other subtypes on ridges may have gnarled trees and canopies that are shorter than those of less exposed forests, but these are not as short unless they are young. The distinction from High Elevation Red Oak Forest (Heath Subtype) is most subtle, since it too has a dense evergreen shrub layer and may be somewhat stunted. The Stunted Heath Subtype is distinguished from the Orchard Forest Subtype, which may have a notably stunted canopy, by having a well-developed, generally very dense, shrub layer.

**Synonyms:** Synonyms: *Quercus rubra* / *Rhododendron catawbiense* - *Rhododendron arborescens* Woodland (CEGL004503).

Ecological Systems: Central and Southern Appalachian Montane Oak Forest (CES202.596).

**Sites:** The Stunted Heath Subtype occurs on sharp ridge tops, peaks, and edges of rock outcrops, where it is exposed to extremes of wind and where soils presumably are shallow or extremely rocky. Known examples range from 3400-5000 feet elevation.

**Soils:** This subtype occurs on rocky or shallow soils. The few examples are mapped as a variety of soil series, primarily Dystrudepts and Humadepts, with no two of the few known examples being the same.

**Hydrology:** This subtype presumably is the driest of the subtypes of High Elevation Red Oak Forest, given the exposed and convex topographic setting.

**Vegetation:** The Stunted Woodland Subtype has a short-stature, open canopy usually dominated by *Quercus rubra*, sometimes with *Quercus alba* codominant or abundant. One apparent example is codominated by *Quercus coccinea*. The most frequent understory or minor canopy species is *Amelanchier arborea*, but *Acer rubrum* is also frequent. Unexpected mesophytic species such as *Tsuga canadensis* or *Betula lenta* may be present. *Castanea dentata* sprouts are abundant in most examples, suggesting this species was a major part of the canopy. The shrub layer is tall and dense. *Kalmia latifolia* or *Rhododendron catawbiense* dominate, but the shrub layer often is fairly diverse. Other shrub species include *Vaccinium corymbosum*, *Rhododendron maximum*, *Ilex montana*, *Rhododendron calendulaceum*, *Lyonia ligustrina*, *Aronia melanocarpa*, *Menziesia pilosa*, *Clethra acuminata*, *Eubotrys recurva*, *Viburnum cassinoides*, *Gaylussacia frondosa*, and in higher

elevation examples, *Vaccinium erythrocarpum*, *Viburnum lantanoides*, and *Sorbus americana*. *Smilax rotundifolia* or *Smilax glauca* may form tangles. Herbs generally are sparse. *Pteridium aquilinum* is the most frequent species. Other species may include *Melampyrum lineare*, *Danthonia spicata*, *Lysimachia quadrifolia*, *Campanula divaricata*, and in high elevation examples, *Eurybia chlorolepis*, *Oclemena acuminata*, and *Angelica triquinata*.

**Range and Abundance:** Ranked G2, but perhaps better treated as G2? Examples are very widely scattered throughout most of the Mountain Region. The association is also known in Georgia and is considered possible in Tennessee and South Carolina.

**Associations and Patterns:** The Stunted Woodland Subtype occurs in small patches, generally grading to other subtypes of High Elevation Red Oak Forest or Montane Oak–Hickory Forest, sometimes to High Elevation Granitic Dome or other rock outcrop communities.

**Variation:** The few known examples are more variable than for most communities, with different shrub layer dominants. The highest elevation examples have a number of high elevation species not found in the other examples, as noted in the vegetation description.

**Dynamics:** Little is known about the dynamics of the Stunted Woodland Subtype. The stunted canopy suggests harsh conditions that limit tree growth and damage canopies frequently, probably wind and ice. Lightning too can be expected to be more frequent in these exposed locations. Unusually severe fires, associated with location on ridges, along with dry conditions, may also be a cause of open canopies and small trees. The dense shrub layer may develop simply because of the open canopy, but also may be related to the conditions that form Heath Balds.

**Comments:**

The Stunted Woodland Subtype was recognized in the 4<sup>th</sup> Approximation and the NVC to cover distinctive vegetation which did not fit other forest categories. No published literature clearly describes it. It is conceptually transitional to Heath Bald, especially to the Southern Mixed Subtype. However, the dynamics and ecological relationships of this subtype are particularly poorly known, and the conditions that create its distinctive vegetation structure may not be the same in all cases. Understanding is inhibited by the difficulty in recognizing it in earlier site descriptions and also in recognizing its distinctive structure in plot data. No published quantitative studies appear to recognize it. Given its rarity, plots that represent it may be dismissed as outliers in quantitative analysis.

This subtype appears to be quite rare, and many apparently-suitable sites do not have it. The corresponding NVC association is described as being particularly tied to granitic domes, but only a few examples in North Carolina are associated with them. The majority of our examples are on sharp ridge tops.

**Rare species:** Nonvascular plants – *Dicranum undulatum*, *Gymnoderma lineare*. Animals – *Sphrapicus varius*.

**References:**