

MONTANE OAK–HICKORY FOREST (WHITE PINE SUBTYPE)

Concept: Montane Oak–Hickory Forests are dominated by mixtures of oaks with *Quercus alba* as a significant component. The White Pine Subtype encompasses examples with a significant component of *Pinus strobus*. Most resemble the Acidic Subtype except for the presence of *Pinus strobus*.

Distinguishing Features: The White Pine Subtype is distinguished by the combination of significant, though not necessarily dominant, *Pinus strobus* in combination with *Quercus alba* under natural conditions. *Pinus strobus* generally provides 25-75% of the canopy cover but may be less in altered stands. It is distinguished from White Pine Forest by having no more than 75 percent of the canopy cover being *Pinus strobus* under natural conditions. It is distinguished from the White Pine Subtype of Chestnut Oak Forest by having *Quercus alba* as a significant canopy component. The White Pine Subtype should only be used where white pine is believed to be naturally present, not for forests where it has been planted or where it likely spread from nearby plantings. *Pinus strobus* that is abundant as saplings but is scarcely present in the canopy probably indicates recent invasion and should not be the basis for recognizing the White Pine Subtype unless other evidence points to it. Some *Pinus strobus* may be present in the Low Dry Subtype, which can be distinguished by the presence of more drought tolerant oaks.

Synonyms: *Pinus strobus* - *Quercus alba* - (*Carya alba*) / *Gaylussacia ursina* Forest (CEGL007517).

Ecological Systems: Southern Appalachian Oak Forest (CES202.886).

Sites: The White Pine Subtype occurs on ridge tops and on upper to lower slopes, spur ridges, and some valley flats. It generally occurs at lower elevations, from 1300-3000 feet, but extends up to 3500 feet or higher in the southern mountains.

Soils: This community occurs on a broad range of uplands soils, mostly Typic Dystrudepts such as Edneyville or Ashe, or Typic Hapludults such as Chester and Evard.

Hydrology: Sites are well drained, and conditions generally are dry-mesic to dry.

Vegetation: The forest is a varying mix in which *Quercus alba* and *Pinus strobus* are both present in significant numbers in the canopy. They may be codominant, or pines may be a fairly small minority. In CVS plot data, *Liriodendron tulipifera*, *Carya tomentosa*, and possibly *Acer rubrum* are the only other canopy species with more than 50% frequency. *Quercus montana*, *Quercus rubra*, *Carya coccinea*, *Carya glabra*, and *Quercus velutina*, all less frequent in the plot data, are more regularly noted in other site descriptions. The understory may include a wide range of species beyond the canopy species. *Oxydendrum arboreum*, *Nyssa sylvatica*, *Cornus florida*, *Magnolia fraseri*, and *Sassafras albidum* are frequent in drier sites, while *Tsuga canadensis* or *Ilex opaca* can dominate the understory in more mesic occurrences. The shrub layer ranges from sparse to dense. Some examples have moderate density of *Kalmia latifolia*, *Gaylussacia ursina*, or *Rhododendron maximum*. Other fairly frequent shrubs in plot data include *Vaccinium pallidum* and *Symplocos tinctoria*, while *Smilax glauca* and *Smilax rotundifolia* are frequent vines. The herb layer is sparse and indicative of acidic soils, with *Goodyera pubescens*, *Chimaphila maculata*,

Polystichum acrostichoides, and *Parathelypteris noveboracensis* having high constancy in plot data, and *Galax urceolata*, *Mitchella repens*, *Lysimachia quadridolia*, *Medeola virginica*, and *Viola hastata* being fairly frequent. Overall species richness is low, averaging 35 species per plot.

Range and Abundance: Ranked G2G3, but probably less rare than this suggests. The White Pine Subtype is most abundant in the Blue Ridge escarpment and foothills, especially in the southern half of the state. It may be more common in the high rainfall area along the South Carolina border, and is more abundant in gorges such as Linville Gorge. It is less common than the Acidic Subtype but probably is less uncommon than the number of records suggests. The association ranges to South Carolina, Georgia, and Tennessee and is questionably attributed to Kentucky.

Associations and Patterns: The White Pine Subtype often is a matrix community where it occurs, forming a substantial part of the landscape mosaic. It can be associated with Montane Oak–Hickory Forest (Acidic Subtype), Chestnut Oak Forest of all subtypes, and Acidic Cove Forest, less often with Rich Cove Forest, Pine–Oak/Heath, rock outcrops, or other communities.

Variation: No variants have been recognized. Examples vary in the relative amount of *Pinus strobus*, but it is unclear when such variation is natural and when it is a result of land use history or alteration of fire.

Dynamics: As with Chestnut Oak Forest (White Pine Subtype), the reason for the occurrence of *Pinus strobus* in this subtype and not in others is not well known. It seems to be something other than the normal gradients of topography, moisture levels, and soil chemistry, since it occurs over a broad range of topography in some places and is absent in others.

Besides occurrence at low elevations, the present of *Pinus strobus* likely depends on some aspect of dynamics. It is generally regarded as intolerant of fire, though catastrophic fire may favor its regeneration. This community is somewhat associated with gorges and other rugged topography, which may reduce fire frequency while not eliminating it entirely. *Pinus strobus* saplings are fairly tolerant of shade, often persisting in large numbers in the understory in this community, and even around single isolated trees in other communities. White pine appears able to take advantage of canopy gaps and to reproduce without fire. These thin-barked saplings are very susceptible to fire, and chronic fire at moderate frequency likely would prevent reproduction of this species.

The response of this community to land use is particularly hard to interpret. *Pinus strobus* may potentially be either increased or decreased by past logging. Saplings appear to be invading forests where the species is not abundant in the canopy, and it is unclear if this is a situation of *Pinus strobus* acting as another mesophytic species spreading in the absence of fire, or if it is returning to places where it was removed from the canopy in the past. Abella and Shelburne (2003) documented the establishment of *Pinus strobus* and abundance of young pines in an oak forest at Ellicott Rock Wilderness where none had been present before 1900 and only small amounts since 1950. Understory and sapling pines were most strongly correlated with the presence of large pines, but can be very abundant where only a few large trees are present.

Abel (1934) noted that *Pinus strobus* suffered little damage from an ice storm that badly damaged oaks. Such storms are common enough that they may help the species coexist with oaks, though this does not appear to explain the variable presence and absence of the species.

Comments: Newell (1997) recognized a *Quercus alba-Pinus strobus/Kalmia latifolia* community in Linville Gorge that clearly is equivalent to this subtype. Callaway, et al. (1987) recognized a white oak-white pine forest which overlapped with other oak forests in ordinations. They described it as being in disturbed areas on limestone, so it is unclear if it is comparable to this natural community.

It is very difficult to distinguish natural occurrence of the White Pine Subtype from successional forests in secondary sources. The discrepancy between vegetation depicted by existing plot data and that often observed in the field may partly result from inclusion of plots in more altered forests. Also, the statistics for CVS data for this subtype are dominated by supplementation of the database by large numbers of plots from focused studies in places where white pine is particularly abundant: Ellicott Rock Wilderness (Patterson 1994) and Thompson River Gorge (Wentworth 1980).

This subtype needs further investigation into its distinctiveness. The recognition of distinct associations for white pine combinations, and the subsequent recognition in the 4th Approximation, may be an example of the “conifer bias” that is frequent in forest ecology, but that fact that the pine is present in some areas and not others suggests the likelihood that it reflects environmental or biogeographic conditions that would lead to additional differences among the subtypes.

Rare species: Vascular plants – *Forthergilla major*, *Liatris turgida*, *Lysimachia fraseri*, *Monotropsis odorata*, *Thermopsis fraxinifolia*.

References:

- Abel, C.A. 1934. Influence of glaze storms upon hardwood forest in the Southern Appalachians. *Journal of Forestry* 32: 35-37.
- Abella, S.R., and V.B. Shelburne. 2003. Eastern white pine establishment in the oak landscape of the Ellicott Rock Wilderness, Southern Appalachian Mountains. *Castanea* 68: 201-210.
- Callaway, R.M., E.E.C. Clebsch, and P.S. White. 1987. A multivariate analysis of forest communities in the western Great Smoky Mountains National Park. *American Midland Naturalist* 118: 107-120.
- Newell, CIL. Local and regional variation in the vegetation of the Southern Appalachian Mountains. PhD. Dissertation, University of North Carolina, Chapel Hill.
- Patterson, K.D. 1994. Classification of vegetation in Ellicott Rock Wilderness, Southeastern Blue Ridge Escarpment. M.S. thesis, North Carolina State University, Raleigh.
- Wentworth, T.R. 1980. Preliminary analysis of vegetation in the Thompson River watershed, North and South Carolina. In H.J. Lieth and E. Landolt (Eds.) *Contributions to the*

knowledge of flora and vegetation in the Carolinas. Veroff. Geobot. Institut ETH, Stiftung
Rubel, Zurich. No. 68.