

PIEDMONT MONADNOCK FOREST (TYPIC SUBTYPE)

Concept: Piedmont Monadnock Forests are very rocky, acidic forests of isolated erosional remnant hills, occasionally of bluffs, in the eastern and central Piedmont. They are dominated by *Quercus montana*, occasionally codominated by *Quercus coccinea*, but lack dominated characteristic montane species of Chestnut Oak Forests. The Typic Subtype covers the most common examples, which lack an appreciable component of either *Pinus echinata* or *Kalmia latifolia*.

Distinguishing Features: Piedmont Monadnock Forests may be distinguished from most communities by the dominance of *Quercus montana*. Some Dry Oak–Hickory Forests that are transitional to this type may have abundant *Quercus montana*, but it does not dominate. Piedmont Monadnock Forests may be distinguished from Chestnut Oak Forests by a more limited flora that lacks many characteristic montane species, such as *Castanea dentata*, *Rhododendron calendulaceum*, *Pyrularia pubera*, *Gaylussacia ursina*, *Magnolia fraseri*, *Carex pensylvanica*, and *Maianthemum racemosum*. Piedmont species such as *Quercus falcata* and *Quercus stellata* are often present.

The Typic Subtype is distinguished by the absence of a significant admixture of pines, more xerophytic oaks, or *Kalmia latifolia*.

Synonyms: *Quercus prinus* - *Quercus alba* / *Oxydendrum arboreum* / *Vitis rotundifolia* Forest (CEGL006281).

Ecological Systems: Southern Piedmont Dry Oak-(Pine) Forest (CES202.339).

Sites: Piedmont Monadnock Forests usually occur on isolated erosional remnant hills, known as inselbergs or monadnocks. The substrate usually is dacite, rhyolite, quartzite, pyrophyllite or other highly weathering-resistant rocks. A few examples occur on bluff tops where there is an abundance of quartz veins.

Soils: Soils are very rocky, well-drained, and generally extremely acidic. Peet and Christensen (1980) suggested that aluminum toxicity might be an important factor at the pH values they measured. The most frequently mapped soil series are Georgeville (Typic Kanhapludult), Tatum, and Uwharrie (Typic Hapludults). Other frequent series include Herndon and Badin (Typic Kanhapludults) and Goldston (Typic Dystrucept), but a wide variety of other Typic Hapludults and Typic Kanhapludults also are mapped.

Hydrology: Sites are dry to xeric due to high topographic position. The high rock content in the soil may contribute to dry conditions.

Vegetation: The Typic Subtype forest is strongly dominated by *Quercus montana*. *Quercus alba*, *Quercus velutina*, *Quercus coccinea*, *Carya glabra*, and *Carya tomentosa* occur with high constancy in CVS plots but in small numbers. *Quercus falcata* and *Quercus stellata* are less frequent, as are small numbers of *Pinus echinata* or *Pinus virginiana*. The understory is generally dominated by *Oxydendrum arboreum*, and *Nyssa sylvatica* and *Acer rubrum* are usually present. Also highly constant, though in small numbers, are *Diospyros virginiana*, *Sassafras albidum*, *Prunus serotina*, and *Cornus florida*. The shrub layer may be sparse to moderate in density.

Vaccinium pallidum usually dominates, and *Vaccinium stamineum* is high constant and often abundant. Other frequent shrubs are *Vaccinium tenellum* and *Vaccinium arboreum*. *Gaylussacia baccata*, in a disjunct population, dominates the shrub layer of one well-known example. *Muscadinia rotundifolia* often covers large areas on the ground, and *Smilax glauca* and *Smilax rotundifolia* are frequent. The herb layer is very sparse. *Chimaphila maculata* is the only highly constant species in CVS plots. Other characteristic species, less frequent in plot data but often observed, include *Danthonia spicata*, *Hieracium venosum*, *Clitoria mariana*, *Schizachyrium scoparium*, *Goodyear pubescens*, *Hylodesmum nudiflorum*, *Pteridium aquilinum* and *Tephrosia virginiana*. Though not found in plots, the additional herb species listed for the Pine Subtype likely occur occasionally and would be more frequent if examples were burned regularly.

Range and Abundance: Ranked G3G4. Piedmont Monadnock Forests occur throughout the Piedmont, except in the foothills, and are most abundant in the Uwharrie area. They are rare in the northeastern Piedmont. The equivalent association ranges to Georgia and Alabama.

Associations and Patterns: Piedmont Monadnock Forests usually occur as large, sometimes small, patches. They usually grade downhill to Dry Oak–Hickory Forest, sometimes directly to more mesic communities. In the Uwharrie area, where Piedmont Monadnock Forests are the most extensive and diverse, the Heath Subtype occurs on north-facing slopes of the hills, the Pine Subtype on west, east, and sometimes south slopes, and the Typic Subtype on the tops. Xeric Piedmont Slope Woodland or Piedmont Acidic Glade often occurs on the south slopes. Where the felsic volcanic rocks give way to mafic volcanic rocks, Dry Basic Oak–Hickory Forest replaces these communities.

Variation: The low diversity makes for less variation than is present in many community types. The few examples that occur on mafic rock monadnocks should be examined for differences that could be recognized as a variant.

Dynamics: The dynamics of Piedmont Monadnock Forests are similar to those of Piedmont oak forests as a whole. The exposure of monadnocks makes them particularly susceptible to lightning and wind. They are also particularly susceptible to fires spreading uphill, which produces increased intensity, though they may also be the starting point for more lightning fires than most places. Nevertheless, tree dynamics appear to be dominated by small to medium size canopy gaps, and forests naturally exist as old-growth, multi-aged stands. The abundance of both small rock outcrops and loose rock in these forests may disrupt fire behavior. As with other Piedmont oak forests, it is presumed that more regular fire would once have supported more grass cover and more herb diversity. The high cover of *Muscadinia rotundifolia* that occurs in many examples might be less with more frequent fire, but this species is capable of quickly recovering its cover.

Comments: Peet and Christensen (1980) recognized monadnock forests as distinct in their analysis of Piedmont vegetation, and they appear to have originated the name. They suggested aluminum toxicity, related to the extremely acidic soils, might be responsible along with dryness for creating these distinctive forests. Not all high hills support Piedmont Monadnock Forest, and a few examples occur in sites other than monadnocks. A few examples also occur on monadnocks composed of mafic rock, which presumably do not have highly acidic soils. It thus is possible that

abundance of rock itself may be an important driver of the abundance of *Quercus montana* and the distinctive character of this community.

Piedmont Monadnock Forest was tentatively treated as a subtype of Chestnut Oak Forest in earlier versions of the 4th Approximation guide. The recognition of several subtypes within it suggests it would be better treated as a distinct type. While floristically depauperate, it appears to be as distinct from montane Chestnut Oak Forest as Montane Oak–Hickory Forest is from Piedmont oak-hickory forests.

This community type is generally quite distinctive in the eastern Piedmont where it reaches its best development near the summits of monadnocks. Farther west, where erosional remnants are larger, it appears to become less distinct, as *Quercus montana* becomes more common in the Dry Oak–Hickory Forest.

Piedmont Monadnock Forests are generally very low in plant diversity. Peet and Christensen (1980) suggest a combination of elevation, dryness, and acidic, nutrient poor soil. Because many examples stand only a few hundred feet above surrounding lands and less than 1000 feet above sea level, elevation is unlikely to be significant. While dryness is clearly important, the subordinate role of *Quercus stellata* and *Q. marilandica* and the absence of *Q. montana* on other dry sites suggests that other factors are important. The low soil pH, infertility, and rockiness are likely factors.

Except in the Uwharrie Mountains and Blue Ridge foothills, monadnocks represent a small portion of the Piedmont landscape. However, since they are usually too rocky and steep to farm and are less accessible than most areas for wood cutting, many examples have escaped total destruction in the past. While cutting and livestock foraging has been universal, a number remain in good condition.

Rare species: Vascular – *Amorpha schwerinii*, *Fothergilla major*, *Monotropsis odorata*, *Smilax biltmoreana*, *Thermopsis mollis* var. *mollis*.

References:

Peet, R.K., and N.L. Christensen. 1980. Hardwood forest vegetation of the North Carolina Piedmont. Veroeff. Geobot. Inst. ETH, Stiftung Rubel, Zurich. 69. Heft: 14-39.

