DRY-MESIC BASIC OAK–HICKORY FOREST (PIEDMONT SUBTYPE)

Concept: Type covers dry-mesic Piedmont and Coastal Plain forests with less acidic and more fertile soils than typical, associated with mafic or intermediate crystalline rocks or occasionally calcareous sedimentary rocks. They are equivalent in moisture regime to Dry-Mesic Oak–Hickory Forest, and fall between Basic Mesic Forest and Dry Basic Oak–Hickory Forest on appropriate substrates.

Subtype covers examples in the Piedmont, believed to be floristically distinct from those in the Coastal Plain.

Sites:
Soils:

Hydrology:
Vegetation:

Dynamics:

Range and Abundance: Ranked G3G4

Associations and Patterns:

Distinguishing Features: The Dry-Mesic Basic Oak–Hickory Forest type is distinguished from Basic Mesic Forest by a drier flora and from Dry Basic Oak–Hickory Forest by a more mesic flora. The canopy is dominated by Quercus alba, along with other oaks and hickories. There is essentially no Fagus grandifolia in the canopy, and Liriodendron is scarce. Drier site oaks such as Quercus stellata, Quercus marilandica, or Quercus falcata are scarce or absent.

This type is distinguished from Dry-Mesic Oak–Hickory Forest by occurrence of more base-loving flora that includes species such as Symphoricarpos orbiculatus, Frangula caroliniana, Celtis spp., Fraxinus americana, Cercis canadensis, Brachyelytrum erectum, and Dichanthelium bosci. Basic indicators also include a set of species that are characteristic of more mesic or floodplain communities but that occur in dry sites that are less acidic. These include Acer floridanum, Carya ovata, Elymus hystrix, Elymus virginicus, Phryma leptostachya, and Phegopteris hexagonoptera. Characteristic species of acidic soils, such as Oxydendrum arboreum, Vaccinium stamineum, Vaccinium pallidum, Vaccinium tenellum, Gaylussacia frondosa, and Chimaphila maculata may be present, but don’t predominate as they do in Dry Mesic Oak–Hickory Forest.

Variation:
...variants:
  1. x
Comments: Although this type is called basic, soil data from Virginia show that many examples do not have basic or even circumneutral pH. But soils have higher pH, higher base saturation, and higher levels of “base” cations than the more acidic Dry-Mesic Oak–Hickory Forest.

The distinction between a Basic and an Intermediate subtype, included in earlier versions of the 4th Approximation guide, has been dropped.

Quercus alba - Quercus rubra - Quercus prinus - Tilia americana var. caroliniana / Ostrya virginiana Forest (CEGL004542) is an association defined by analysis of Uwharrie Mountains CVS data, where it is represented by 5 plots (2-151, 2-165, 3-167, 3-168, and 6-151). The plots share a common feature of abundant Tilia americana var. caroliniana, but vary drastically in canopy dominants and even setting, with one apparently occurring on an alluvial terrace. For the upland sites, it is unclear how they would be distinguished from other Dry-Mesic Basic Oak–Hickory Forests, other than by the abundance of Tilia, one of a suite of basic indicators but a stronger basic indicator than most. The distinctness of this association needs to be assessed against a broader data set of basic communities, and field relations need to be determined.

Synonyms: Quercus alba - Quercus rubra - Carya (ovata, carolinae-septentrionalis) / Cercis canadensis Forest (CEGL007232).


Rare species:

References:

BASIC OAK--HICKORY FOREST

Sites: Slopes, ridges, upland flats, and other dry to dry-mesic sites on basic or circumneutral soils.

Soils: Generally Hapludalfs, developed from rocks such as diabase, gabbro, or mafic metamorphics. Series include Iredell (Typic Hapludalf), Mecklenburg (Ultic Hapludalf), Pinkston (Ruptic-Ultic Dystrochrept), and Picture (Abruptic Argiaquoll).

Hydrology: Terrestrial, dry to dry-mesic.

Vegetation: Canopy dominated by mixtures of oaks and hickories, including Quercus alba, Q. stellata, Q. velutina, Q. muehlenbergii, various other oaks, Carya carolinae-septentrionalis, C. glabra, C. alba (tomentosa), and C. ovalis. Other trees include Fraxinus americana, Liriodendron tulipifera, Juglans nigra, and Pinus spp. Understory includes species such as Cornus florida, Cercis canadensis, Chionanthus virginicus, Acer leucoderme, and Ostrya virginiana. Shrubs may include
Calycanthus floridus, Aesculus sylvatica, Rhus aromatica, Symphoricarpos orbiculatus, Viburnum acerifolium, Viburnum prunifolium, and Viburnum rafinesquianum. The herb layer is usually moderately diverse, with species such as Carex aritecta, C. nigromarginata, Polygonatum biflorum, Galium circaeazans, Uvularia perfoliata, Scleria oligantha, Aristolochia serpentaria, Euphorbia corollata, and in the mesic part of the range of this type, as on lower slopes, many of the herbs of the Basic Mesic Forest.

Dynamics: Disturbed areas have increased amounts of pines and weedy hardwoods such as Acer rubrum and Liquidambar styraciflua, with the amounts depending on the degree of canopy opening. Areas that were cultivated are generally dominated by even-aged pine stands which are replaced by the climax oaks and hickories only as the pines die. Selectively logged areas may have a mixture of hardwoods and pines.

Under natural conditions these forests are uneven-aged, with old trees present. Reproduction occurs primarily in canopy gaps. Rare severe natural disturbances such as wind storms may allow pulses of increased regeneration and allow the less shade tolerant species to remain in the community. However, Skeen, Carter, and Ragsdale (1980) argued that even the shade-intolerant Liriodendron could reproduce enough in gaps to persist in the climax Piedmont forests.

The natural fire regime of the Piedmont is not known, but fires certainly occurred periodically. Most of the component trees are able to tolerate light surface fires with little effect. Regular fire may have created a more open forest, with gaps persisting longer than at present and perhaps forming more frequently.

Range: Scattered in the Piedmont, very rare in the Coastal Plain and lower Blue Ridge.

Associations: Often associated with Xeric Hardpan Forest and Upland Depression Swamp Forest. Grades into Basic Mesic Forest (various subtypes) downslope or in more sheltered sites. Grades to regular (acidic) upland forest communities at geologic contacts.

Distinguishing Features: The factors distinguishing Basic Oak--Hickory Forests from Dry and Dry-Mesic Oak--Hickory Forests are not well known. Vegetational differences include a greater diversity of plant species, greater importance of hickories, and a variety of herbs generally associated with more mesic areas. Acid-loving species such as Vaccinium spp. and Oxydendrum arboreum are sparse or absent. Circumneutral or higher soil pH is a good indicator. Occurrence on mafic rock or on one of the soil series listed above suggests that a site is Basic Oak--Hickory Forest, although sites mapped as these soils sometimes give no vegetational indication of having basic soils. Basic Oak--Hickory Forests are distinguished from Basic Mesic Forest by the dominance of oaks and hickories in the canopy, and the absence or near absence of species such as Fagus grandifolia.

Basic Oak--Hickory Forests are distinguished from Xeric Hardpan Forests by canopy dominance, more mesic species composition, and closed canopy. They are distinguished from Piedmont Mafic Cliff or Piedmont Calcareous Cliff by naturally having a closed or nearly closed canopy.

Variation: Two variants are recognized:
1. Mafic Substrate Variant, on mafic igneous or metamorphic rocks.
2. Calcareous Substrate Variant, on limestone, dolomite, or calcite-cemented clastic sedimentary rocks.

There are apparently associated floristic differences which eventually may warrant separation into two subtypes or types. Some sites on metamorphosed argillite or graywacke may be intermediate. Examples also vary with moisture regime and soil pH.

Comments: This type covers a moisture range equivalent to both the Dry and Dry-Mesic Oak--Hickory Forest types. This is partly because less is known about these communities than their more common acidic counterparts and there is less basis for splitting types. It is also somewhat more difficult to tell moisture levels by the vegetation in these communities. Many species that are confined to relatively mesic areas on acidic substrates occur in apparently drier sites on higher pH soils. Many sites also probably have some clay hardpan development, though less so than in the Xeric Hardpan Forest or Upland Depression Swamp Forest. These areas may be alternately wet and dry, and often contain unusual mixtures of species.

Although mesic forests on basic rock are widely regarded as distinctive from those on acidic rock, drier basic forests are less often addressed. It may be that the greater erosion and leaching on higher areas, combined with greater water limitation on plants, makes the distinction between acidic and basic substrates less clear in dry sites. A number of species occur in these communities that are usually confined, on more acidic soils, to more mesic sites.

Rare Plant Species: Vascular -- Agastache nepetoides, Baptisia australis var. australis, Berberis canadensis, Buchnera americana, Cirsium carolinianum, Hexalectris spicata, Lathyrus venosus, Lotus purshianus var. helleri, Nestronia umbellula, Polygala senega, Porteranthus stipulatus, Ruellia purshiana, Silphium terebinthinaceum, Sisyrinchium dichotomum, Smilax biltmoreana, Smilax lasioneura, Solidago ptarmicoides.

Synonyms:
Dry Eutrophic, Dry-Mesic Eutrophic (Peet and Christensen 1980).

Examples:
Frogsboro Upland Depression Forest site, Caswell Game Land, Caswell County.
Goshen Gabbro Forest, Granville County (LeGrand 1986).
South Butner Diabase Hardwood Forest, Granville County (LeGrand 1986).
Uwharrie Mafic Rock Area, Uwharrie National Forest, Montgomery County.
Cedar Mountain, Rockingham County.
Mason Farm Southern Shagbark Hickory Forest, Orange County (Sather and Hall 1988).
Linville Caverns, Burke County.


Sample Plant Communities:
Carya glabra-Mixed upland oaks and hickories.
Mixed upland hickories/Cornus florida.
Mixed upland oaks.
Mixed upland oaks/Mixed subcanopy hardwoods-Cornus florida.
Mixed upland oaks-Mixed upland hardwoods/Mixed subcanopy hardwoods.
Mixed upland oaks-Mixed upland hardwoods/Mixed subcanopy hardwoods/Polystichum acrostichoides-Mixed herbs.
Mixed upland oaks-Mixed upland hickories.
Mixed upland oaks-Mixed upland hickories/Ostrya virginiana-Mixed subcanopy hardwoods.
Quercus alba-Quercus rubra/Acer saccharum-Mixed subcanopy hardwoods/Panicum spp.-Mixed herbs.
Carya carolinae-septentrionalis-Mixed oaks/Viburnum rafinesquianum-Mixed shrubs.
Carya carolinae-septentrionalis-Mixed oaks/Acer leucoderme.