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## **ECOLOGICAL SYSTEM: NORTHERN ATLANTIC COASTAL PLAIN DRY HARDWOOD FOREST**

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**Summary:** This system is comprised of dry hardwood forests largely dominated by oaks, ranging from sandy glacial and outwash deposits of Cape Cod, Massachusetts, and Long Island, New York, south to the Coastal Plain portions of Maryland and possibly northern Virginia. These forests occur on acidic, sandy to gravelly soils with a thick duff layer, often with an ericaceous shrub layer.

**Range:** This system ranges from sandy glacial and outwash deposits of Massachusetts and Long Island, New York (and occasionally north to southern Maine), south to the Coastal Plain portions of Maryland and northern Virginia. United States: CT?, DE, MA, MD, ME, NH?, NJ, NY, VA

### **Delaware Estuary Associations:**

- Coastal Oak / Laurel Forest
- Coastal Plain Chestnut Oak - Beech Forest
- Mid-Atlantic Mesic Mixed Hardwood Forest
- North Atlantic Coastal Oak - Holly Forest
- Northeastern Atlantic Coastal Oak - Beech Forest
- Northeastern Coastal Oak - Heath Forest
- Northeastern Dry Oak-Hickory Forest
- Southern Red Oak / Heath Forest
- Xeric Paleodune Oak - Sand Hickory Woodland

### **CLASSIFIERS FOR NORTHERN ATLANTIC COASTAL PLAIN DRY HARDWOOD FOREST**

**Primary Division:** 203

**Land Cover Class:** Forest and Woodland

**Spatial Scale & Pattern:** Large patch

**Required Classifiers:** Natural/Semi-natural; Vegetated (>10% vasc.); Upland

**Diagnostic Classifiers:** Forest and Woodland (Treed); Long Disturbance Interval; Broad-Leaved Deciduous Tree

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## **COASTAL OAK / LAUREL FOREST**

*Quercus velutina* - *Quercus coccinea* - *Quercus prinus* / *Kalmia latifolia* Forest

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**Range:** The distribution of this type is centered in New Jersey and Long Island, New York. It may also occur in surrounding states including Delaware.

**Environmental Description:** These forests occur on sandy, gravelly soils of moraine and glacial outwash plains. The soils may have a higher clay content than other coastal forests. They commonly occur on convex slopes.

**Vegetation Description:** This coastal oak-laurel forest is dominated by *Quercus coccinea* (scarlet oak), *Quercus velutina* (black oak), *Quercus prinus* (chestnut oak), and *Quercus alba* (white oak). Pines (*Pinus rigida* (pitch pine), *Pinus echinata* (shortleaf pine), or *Pinus virginiana* (Virginia pine)) may be present at low cover in some examples. *Kalmia latifolia* (mountain laurel) is the dominant shrub forming extensive, dense patches, with other ericaceous shrubs such as *Vaccinium pallidum* (hillside blueberry), *Vaccinium stamineum* (deerberry), and *Gaylussacia baccata* (black huckleberry) contributing low cover. The herbaceous layer is sparse due to the dense *Kalmia latifolia* (mountain laurel) and may include *Pteridium aquilinum* (bracken fern), *Gaultheria procumbens* (wintergreen), *Carex pensylvanica* (Pennsylvania sedge), and *Carex albicans* (white-tinge sedge).

**Characteristic Species:** *Quercus prinus* (chestnut oak)

**Dynamics/Successional Trajectory:** This forest is similar to chestnut oak forests of the Appalachian Mountains, but is distinguished by its location on the Coastal Plain. It occurs adjacent to areas that are directly influenced by maritime processes.

**Reference Sites:** NJ Pine Barrens - Peaslee WMA, NJ; Brendan Byrne State Forest, NJ

**Global and State Conservation Ranks and Reasons:** GNR (1-Dec-1997). DE?: SNA, NJ: S3.

**VegBank Link for Plot Data:** [http://vegbank.org/natureserve/element\\_global.2.688806](http://vegbank.org/natureserve/element_global.2.688806)

**References:** Breden 1989, Breden et al. 2001, Eastern Ecology Working Group n.d., Edinger et al. 2002, Greller 1977, Hunt 1997a, Sperduto and Nichols 2004, Windisch 1995b

MOST ABUNDANT SPECIES		
STRATUM	LIFEFORM	SPECIES
Tree canopy	Broad-leaved deciduous tree	<i>Quercus alba</i> (white oak)
Tree canopy	Broad-leaved deciduous tree	<i>Quercus coccinea</i> (scarlet oak)
Tree canopy	Broad-leaved deciduous tree	<i>Quercus prinus</i> (chestnut oak)
Tree canopy	Broad-leaved deciduous tree	<i>Quercus velutina</i> (black oak)
Shrub/sapling (tall & short)	Broad-leaved evergreen shrub	<i>Kalmia latifolia</i> (mountain laurel)

### COASTAL PLAIN CHESTNUT OAK - BEECH FOREST

*Quercus prinus* - *Quercus velutina* - *Fagus grandifolia* / *Kalmia latifolia* Forest

**Range:** This community occurs in the Delaware and in the New Jersey portions of the Delaware Estuary.

**Environmental Description:** This mesic mixed oak and beech forest occurs on the Coastal Plain and northern Piedmont, where it was formerly widespread, particularly on the Inner Coastal Plain. It occurs rarely on the edges of the Outer Coastal Plain.

**Vegetation Description:** *Quercus prinus* (chestnut oak) and *Quercus velutina* (black oak) are dominant trees, with smaller amounts of *Fagus grandifolia* (American beech), *Quercus alba* (white oak), *Quercus coccinea* (scarlet oak), and *Acer rubrum* (red maple). Rarely, *Sassafras albidum* (sassafras), *Carya* (hickory) spp., or *Liriodendron tulipifera* (tuliptree) may occur. A subcanopy stratum of *Cornus florida* (flowering dogwood) is typically also present, occasionally with *Ilex opaca* (American holly). The shrub stratum is strongly dominated by *Kalmia latifolia* (mountain laurel), with smaller amounts of *Rhododendron periclymenoides* (pink azalea), *Vaccinium corymbosum* (highbush blueberry), and *Gaylussacia baccata* (black huckleberry), or only *Gaylussacia baccata* (black huckleberry) and *Vaccinium pallidum* (hillside blueberry) in some patches. On northern exposures, *Fagus grandifolia* (American beech) may become a codominant, and *Kalmia latifolia* (mountain laurel) may reach 75-100% cover.

**Characteristic Species:** *Kalmia latifolia* (mountain laurel), *Quercus prinus* (chestnut oak)

**Reference Sites:** Drawer's Creek, DE

**Global and State Conservation Ranks and Reasons:** GNR (7-Nov-2000). DE: SNR, NJ: SNR.

**VegBank Link for Plot Data:** [http://vegbank.org/natureserve/element\\_global.2.683683](http://vegbank.org/natureserve/element_global.2.683683)

**References:** Eastern Ecology Working Group n.d., Windisch 1995b

MOST ABUNDANT SPECIES		
STRATUM	LIFEFORM	SPECIES
Tree canopy	Broad-leaved deciduous tree	<i>Quercus velutina</i> (black oak)
Tree subcanopy	Broad-leaved deciduous tree	<i>Cornus florida</i> (flowering dogwood)
Tall shrub/sapling	Broad-leaved evergreen shrub	<i>Kalmia latifolia</i> (mountain laurel)

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## MID-ATLANTIC MESIC MIXED HARDWOOD FOREST

*Fagus grandifolia* - *Quercus* (*alba*, *rubra*) - *Liriodendron tulipifera* / *Polystichum acrostichoides* Forest

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**Range:** This association is currently described from Virginia northward to southern New England. The type is characteristic of the Coastal Plain throughout its range and of the Piedmont from south-central Virginia through much of Maryland. Small outliers of this vegetation occur at low elevations on both flanks of the Blue Ridge in Virginia and Maryland. This type occurs in the Delaware Estuary, in both New Jersey and Delaware.

**Environmental Description:** This forest association occurs on mesic to submesic slopes or gentle gradients. Ravines in dissected topography are particularly typical sites in the Piedmont and parts of the Inner Coastal Plain. The type also occupies rolling uplands with deep soils. Soils are typically well-drained, acidic sandy and silt loams derived from parent material of low to moderate fertility.



Photo by Keith Clancey

**Vegetation Description:** Rangewide, this vegetation type is characteristically a mixed mesophytic forest dominated by *Fagus grandifolia* (American beech), *Quercus alba* (white oak), *Quercus rubra* (northern red oak), and *Liriodendron tulipifera* (tuliptree) in various proportions. Overstory associates over the range include *Carya alba* (mockernut hickory), *Carya glabra* (pignut hickory), *Quercus velutina* (black oak), *Quercus falcata* (southern red oak), *Quercus coccinea* (scarlet oak), *Liquidambar styraciflua* (sweetgum), *Acer rubrum* (red maple), *Nyssa sylvatica* (blackgum), and *Fraxinus americana* (white ash). The subcanopy is characterized by young *Fagus grandifolia* (American beech), *Acer rubrum* (red maple), *Carpinus caroliniana* (American hornbeam), *Cornus florida* (flowering dogwood), *Ilex opaca* (American holly), and *Sassafras albidum* (sassafras). The shrub layer varies from very sparse to well-developed and can include *Asimina triloba* (common pawpaw), *Viburnum acerifolium* (mapleleaf viburnum), *Viburnum dentatum* (southern arrow-wood), and *Euonymus americana*. Heath shrubs, such as *Vaccinium corymbosum* (highbush blueberry) and *Vaccinium pallidum* (hillside blueberry), may be common but not abundant. Vines are common, including *Parthenocissus quinquefolia* (Virginia creeper), *Smilax glauca* (whiteleaf greenbrier), and *Toxicodendron radicans* (eastern poison-ivy). The herb layer is comprised of *Polystichum acrostichoides* (Christmas fern), *Uvularia perfoliata* (perfoliate bellwort), *Cypripedium acaule* (pink lady's-slipper), *Mitchella repens* (partridgeberry), *Tipularia discolor* (crippled crane-fly), *Goodyera pubescens* (downy rattlesnake-plantain), *Eurybia divaricata* (white wood-aster), *Chimaphila maculata* (striped pipsissewa), *Carex swanii* (swan's sedge), *Medeola virginiana* (Indian cucumber-root), *Athyrium filix-femina* (common ladyfern), *Carex digitalis* (slender wood sedge), *Carex willdenowii* (Willdenow's sedge), *Epifagus virginiana* (beechdrops), *Maianthemum canadense* (Canada mayflower), *Desmodium nudiflorum* (naked-flower tick-trefoil), *Polygonatum biflorum* (smooth Solomon's-seal), *Podophyllum peltatum* (mayapple), *Arisaema triphyllum* (Jack-in-the-pulpit), and *Maianthemum racemosum* (feathery false lily-of-the-valley). Several intergrading compositional variants have been noted in regional and local

landscape analyses. On more submesic, convex slopes, *Fagus grandifolia* (American beech), *Quercus alba* (white oak), *Cornus florida* (flowering dogwood), and *Vaccinium pallidum* (hillside blueberry) tend to be prominent, while pronounced mesophytes, such as *Carpinus caroliniana* (American hornbeam) and herbaceous species in general, are usually sparse. Coastal Plain stands tend to have understories heavily dominated by *Ilex opaca* (American holly), while Piedmont stands generally have only scattered *Ilex opaca* (American holly), as well as slightly higher herbaceous richness.

**Characteristic Species:** *Fagus grandifolia* (American beech), *Liriodendron tulipifera* (tuliptree), *Polystichum acrostichoides* (Christmas fern)

**Reference Sites:** Augustine Creek, DE; Clayton Park (Monmouth County Park), Imlaystown, NJ

**Global and State Conservation Ranks and Reasons:** G5 (24-Jan-2005). DE: S5, NJ: S3, PA: S1. This association is common and widespread on the eastern Coastal Plain.

**VegBank Link for Plot Data:** [http://vegbank.org/natureserve/element\\_global.2.684506](http://vegbank.org/natureserve/element_global.2.684506)

**References:** Bartgis 1986, Berdine 1998, Bernard and Bernard 1971, Bowman 2000, Breden 1989, Breden et al. 2001, Clancy 1993b, Clancy 1996, Davis et al. 1992, Eastern Ecology Working Group n.d., Edinger et al. 2002, Fleming 2001, Fleming et al. 2001, Fleming pers. comm., Harrison 2004, Lea 2003, McCoy and Fleming 2000, Metzler and Barrett 2001, Patterson pers. comm., Rawinski 1984, Robichaud and Buell 1973, Smith 1983

MOST ABUNDANT SPECIES		
STRATUM	LIFEFORM	SPECIES
Tree canopy	Broad-leaved deciduous tree	<i>Fagus grandifolia</i> (American beech)
Tree canopy	Broad-leaved deciduous tree	<i>Liriodendron tulipifera</i> (tuliptree)
Tree canopy	Broad-leaved deciduous tree	<i>Quercus alba</i> (white oak)
Tree subcanopy	Broad-leaved deciduous tree	<i>Cornus florida</i> (flowering dogwood)
Tree subcanopy	Broad-leaved evergreen tree	<i>Ilex opaca</i> (American holly)
Herb (field)	Vine/Liana	<i>Parthenocissus quinquefolia</i> (Virginia creeper)
Herb (field)	Forb	<i>Podophyllum peltatum</i> (mayapple)
Herb (field)	Forb	<i>Polygonatum biflorum</i> (smooth Solomon's-seal)
Herb (field)	Fern or fern ally	<i>Polystichum acrostichoides</i> (Christmas fern)

## NORTH ATLANTIC COASTAL OAK - HOLLY FOREST

*Quercus velutina* / *Ilex opaca* Forest

**Range:** This community occurs in the New Jersey portion and possibly the Delaware portion of the Delaware Estuary.

**Environmental Description:** This forest occurs on mesic, moderately well-drained silts and sandy loams in low areas on the landscape that are sheltered from direct maritime influences. There are often small-scale wetter depressions within low plateaus occupied by this association.

**Vegetation Description:** This coastal oak-holly forest is dominated by *Quercus velutina* (black oak), *Fagus grandifolia* (American beech), *Quercus alba* (white oak), *Acer rubrum* (red maple), and *Nyssa sylvatica* (blackgum). *Ilex opaca* (American holly) is abundant in the subcanopy. Other associated species that occur at low cover include *Amelanchier canadensis* (Canada serviceberry), *Sassafras albidum* (sassafras), and *Quercus alba* (white oak). Shrubs are common and include *Vaccinium corymbosum* (highbush blueberry), *Hamamelis virginiana* (American witch-hazel), *Viburnum recognitum* (northern arrow-wood), and *Kalmia latifolia* (mountain laurel). Vines are common but not usually abundant, and include such species as *Toxicodendron radicans* (eastern poison-ivy), *Parthenocissus quinquefolia* (Virginia creeper), *Smilax rotundifolia* (roundleaf greenbrier), *Smilax glauca* (whiteleaf

greenbrier), and *Vitis* (grape) spp. Characteristic herbs include *Trientalis borealis* (starflower), *Carex swanii* (swan's sedge), and *Thelypteris noveboracensis* (New York fern).

**Characteristic Species:** *Carex swanii* (swan's sedge), *Ilex opaca* (American holly), *Thelypteris noveboracensis* (New York fern), *Trientalis borealis* (starflower)

**Reference Sites:** Lowlands Forest, Gloucester County, NJ; Mill Creek Park on Rancocas Creek, NJ; Higbee Beach WMA, Cape May, NJ

**Global and State Conservation Ranks and Reasons:** GNR (1-Dec-1997). DE?:SNA, NJ: SNR.

**VegBank Link for Plot Data:** [http://vegbank.org/natureserve/element\\_global.2.683341](http://vegbank.org/natureserve/element_global.2.683341)

**References:** Breden 1989, Breden et al. 2001, Eastern Ecology Working Group n.d., Edinger et al. 2002, Greller 1977, Hunt 1997a, Lundgren 1998, Rawinski 1984, Swain and Kearsley 2001

MOST ABUNDANT SPECIES		
STRATUM	LIFEFORM	SPECIES
Tree canopy	Broad-leaved deciduous tree	<i>Fagus grandifolia</i> (American beech)
Tree canopy	Broad-leaved deciduous tree	<i>Quercus alba</i> (white oak)
Tree canopy	Broad-leaved deciduous tree	<i>Quercus velutina</i> (black oak)
Tree subcanopy	Broad-leaved evergreen tree	<i>Ilex opaca</i> (American holly)
Shrub/sapling (tall & short)	Broad-leaved deciduous shrub	<i>Vaccinium corymbosum</i> (highbush blueberry)

## NORTHEASTERN ATLANTIC COASTAL OAK - BEECH FOREST

*Fagus grandifolia* - *Quercus alba* - *Quercus rubra* Forest

**Range:** These forests occur along the North Atlantic Coast in Massachusetts, New York, New Jersey, and possibly Rhode Island. This vegetation community occurs in New Jersey's portion of the Delaware Estuary.

**Environmental Description:** These forests occur on dry, well-drained loamy sand of morainal coves and upper marl ravines on the Coastal Plain.

**Vegetation Description:** This coastal oak-beech forest has a mixed canopy of *Fagus grandifolia* (American beech), *Quercus alba* (white oak), and *Quercus velutina* (black oak) in varying proportions. *Quercus rubra* (northern red oak) is a common associate, although it never occurs in abundance. Occasional canopy associates that occur with low cover can include *Quercus coccinea* (scarlet oak), *Quercus prinus* (chestnut oak), and *Acer saccharum* (sugar maple). There are relatively few shrubs, and the herb layer includes tree seedlings, especially *Quercus* (oak) spp. and *Fagus grandifolia* (American beech), plus *Carex swanii* (swan's sedge), *Maianthemum canadense* (Canada mayflower), *Eurybia divaricata* (white wood-aster), *Epifagus virginiana* (beechdrops), and *Maianthemum racemosum* (feathery false lily-of-the-valley).

**Characteristic Species:** *Fagus grandifolia* (American beech), *Quercus alba* (white oak), *Quercus velutina* (black oak)

**Dynamics/Successional Trajectory:** This is a coastal forest community and, as such, is not influenced directly by maritime processes, although it is moderately influenced by minor salt spray from severe storms. This association grades into other coastal oak forest types as well as beech-maple types.

**Reference Sites:** Crosswicks Creek, Mantua Creek, Raccoon Creek, Oldman's Creek, NJ

**Global and State Conservation Ranks and Reasons:** GNR (1-Dec-1997). NJ: S2.

**VegBank Link for Plot Data:** [http://vegbank.org/natureserve/element\\_global.2.689277](http://vegbank.org/natureserve/element_global.2.689277)

**References:** Breden 1989, Breden et al. 2001, Eastern Ecology Working Group n.d., Edinger et al. 2002, Godfrey et al. 1978, Greller 1977, Greller et al. 1978, Hunt 1997a, Metzler and Barrett 2001, Rawinski 1984, Swain and Kearsley 2001

MOST ABUNDANT SPECIES		
STRATUM	LIFEFORM	SPECIES
Tree canopy	Broad-leaved deciduous tree	<i>Fagus grandifolia</i> (American beech)
Tree canopy	Broad-leaved deciduous tree	<i>Quercus alba</i> (white oak)

## NORTHEASTERN COASTAL OAK - HEATH FOREST

*Quercus coccinea* - *Quercus velutina* / *Sassafras albidum* / *Vaccinium pallidum* Forest

**Range:** This type occurs in coastal areas from New Hampshire to New Jersey.

**Environmental Description:** This association occurs on rapidly drained, nutrient-poor, sandy or gravelly soils. North of the glacial border, these soils are typically found on till or outwash.

**Vegetation Description:** This dry coastal oak-heath forest is dominated by *Quercus coccinea* (scarlet oak), *Quercus velutina* (black oak), and *Quercus alba* (white oak), the latter species particularly characteristic of gravel substrates. Other less abundant canopy associates include *Quercus prinus* (chestnut oak) and *Ilex opaca* (American holly) (usually less than 15% cover). *Pinus rigida* (pitch pine) is a common associate but occurs at low cover. *Sassafras albidum* (sassafras) may occur in low cover and may indicate influence by coastal (but not maritime) climate where this type occurs. (Note: in New Jersey there is a stunted *Sassafras albidum* (sassafras)-dominated woodland on xeric sand that may be a variant of this forest or a new type.) *Castanea dentata* (American chestnut) saplings can be common. A "lawn-like" dwarf-shrub heath layer dominated by *Vaccinium pallidum* (hillside blueberry), *Vaccinium angustifolium* (northern lowbush blueberry), and *Gaylussacia baccata* (black huckleberry) is characteristic. *Gaylussacia frondosa* (dangleberry) also occurs in some stands. The herbaceous layer is typically sparse, with *Carex pensylvanica* (Pennsylvania sedge), *Pteridium aquilinum* (bracken fern), and *Gaultheria procumbens* (wintergreen) being the most common. Herb diversity is greater in small canopy gaps, where *Helianthemum canadense* (long-branch frostweed), *Tephrosia virginiana* (goat's-rue), *Aureolaria* (yellow false foxglove) spp., *Lespedeza* (bushclover) spp., *Lechea* (pinweed) spp., and *Arctostaphylos uva-ursi* (bearberry) occur.



Photo by Andrew Windisch

**Characteristic Species:** *Gaylussacia baccata* (black huckleberry), *Quercus coccinea* (scarlet oak), *Vaccinium angustifolium* (northern lowbush blueberry), *Vaccinium pallidum* (hillside blueberry)

**Dynamics/Successional Trajectory:** This is a coastal forest that occurs beyond direct influence of maritime processes.

**Reference Sites:** NJ Pine Barrens - Brendan Byrne State Forest, NJ

**Global and State Conservation Ranks and Reasons:** GNR (1-Dec-1997). NJ: S1S3.

**VegBank Link for Plot Data:** [http://vegbank.org/natureserve/element\\_global.2.688944](http://vegbank.org/natureserve/element_global.2.688944)

**References:** Breden 1989, Breden et al. 2001, Clark 1986, Eastern Ecology Working Group n.d., Edinger et al. 2002, Enser 1999, Greller 1977, Lundgren 2000, Metzler and Barrett 2001, Motzkin and Foster 2002, Rawinski 1984, Reschke 1990, Sperduto 1996, Swain and Kearsley 2001

## MOST ABUNDANT SPECIES

STRATUM	LIFEFORM	SPECIES
Tree canopy	Broad-leaved deciduous tree	<i>Quercus alba</i> (white oak)
Tree canopy	Broad-leaved deciduous tree	<i>Quercus coccinea</i> (scarlet oak)
Tree canopy	Broad-leaved deciduous tree	<i>Quercus velutina</i> (black oak)
Tree subcanopy	Broad-leaved deciduous tree	<i>Sassafras albidum</i> (sassafras)
Short shrub/sapling	Broad-leaved deciduous shrub	<i>Gaylussacia baccata</i> (black huckleberry)
Short shrub/sapling blueberry)	Broad-leaved deciduous shrub	<i>Vaccinium angustifolium</i> (northern lowbush blueberry)
Short shrub/sapling	Broad-leaved deciduous shrub	<i>Vaccinium pallidum</i> (hillside blueberry)
Herb (field)	Graminoid	<i>Carex pensylvanica</i> (Pennsylvania sedge)

## NORTHEASTERN DRY OAK-HICKORY FOREST

*Quercus (alba, rubra, velutina) / Cornus florida / Viburnum acerifolium* Forest

**Range:** This association occurs from Maine to Virginia. This forest type is very common on mid- to upper slopes and dry mesic sites in Pennsylvania. It occurs in all three states of the Delaware Estuary.

**Environmental Description:** This forest type occurs on well-drained loamy sand of midslopes. The sites may be gently to steeply sloping and may contain scattered boulders or large rocks.

**Vegetation Description:** *Quercus rubra* (northern red oak), *Quercus alba* (white oak), and *Quercus velutina* (black oak) are prominent in the canopy. Typical hickory species include *Carya glabra* (pignut hickory), *Carya ovata* (shagbark hickory), *Carya alba* (mockernut hickory), and *Carya ovalis* (red hickory).

Other canopy associates may include *Acer rubrum* (red maple), *Sassafras albidum* (sassafras), and *Amelanchier arborea* (common serviceberry). At the northern range limit of this type, *Pinus strobus* (eastern white pine) and *Betula lenta* (sweet birch) also occur as minor associates. *Cornus florida* (flowering dogwood) is a characteristic understory tree in portions of the range. The shrub layer is characterized by *Viburnum acerifolium* (mapleleaf viburnum), with other frequent associates including *Hamamelis virginiana* (American witch-hazel), *Vaccinium corymbosum* (highbush blueberry), *Corylus cornuta* (beaked hazelnut), and *Corylus americana* (American hazelnut). A dwarf-shrub layer may be common, but generally not abundant, and characterized by *Vaccinium pallidum* (hillside blueberry) and *Gaylussacia baccata* (black huckleberry), with *Vaccinium angustifolium* (northern lowbush blueberry) occurring more frequently to the north. The herbaceous layer is characterized by *Carex pensylvanica* (Pennsylvania sedge), *Maianthemum racemosum* (feathery false lily-of-the-valley), *Aralia nudicaulis* (wild sarsaparilla), *Hieracium venosum* (rattlesnake-weed), *Solidago bicolor* (white goldenrod), *Desmodium glutinosum* (large tick-trefoil), *Desmodium paniculatum* (narrowleaf tick-trefoil), *Melampyrum lineare* (narrowleaf cow-wheat), *Chimaphila maculata* (striped pipsissewa), *Eurybia divaricata* (white wood-aster), *Danthonia spicata* (poverty oatgrass), *Aureolaria* (yellow false foxglove) spp., and *Helianthemum canadense* (long-branch frostweed).

**Characteristic Species:** *Carex pensylvanica* (Pennsylvania sedge), *Cornus florida* (flowering dogwood), *Gaylussacia baccata* (black huckleberry), *Vaccinium pallidum* (hillside blueberry), *Viburnum acerifolium* (mapleleaf viburnum)



Photo by Pennsylvania Natural Heritage Program

**Dynamics/Successional Trajectory:** This vegetation is ecologically transitional between dry-rich oak-hickory forests of relatively high diversity and dry, acidic oak-species-poor forests.

**Management Concerns:** Mature stands are uncommon, and most stands are subject to logging disturbances or even complete destruction if located in rapidly developing suburban areas.

**Reference Sites:** East Blackbird Drainage, DE; Rancocas State Park, NJ; Hopewell Furnace National Historic Site, Berks County, PA

**Global and State Conservation Ranks and Reasons:** G4G5 (24-Jan-2005). DE: S3?, NJ: S4S5, PA: SNR. This type is not naturally rare and has a wide geographic distribution.

**VegBank Link for Plot Data:** [http://vegbank.org/natureserve/element\\_global.2.685156](http://vegbank.org/natureserve/element_global.2.685156)

**References:** Bartgis 1986, Berdine 1998, Breden 1989, Breden et al. 2001, Clancy 1996, Damman 1977, Eastern Ecology Working Group n.d., Edinger et al. 2002, Enser 1999, Fike 1999, Fleming et al. 2001, Fleming et al. 2004, Fleming pers. comm., Gawler 2002, Harrison 2004, Hunt 1997a, MENHP 1991, McCoy and Fleming 2000, Metzler and Barrett 2001, Patterson pers. comm., Rawinski 1984, Sperduto 1997b, Sperduto and Nichols 2004, Swain and Kearsley 2001, VDNH 2003

MOST ABUNDANT SPECIES		
STRATUM	LIFEFORM	SPECIES
Tree canopy	Broad-leaved deciduous tree	<i>Carya glabra</i> (pignut hickory)
Tree canopy	Broad-leaved deciduous tree	<i>Quercus rubra</i> (northern red oak)
Tree canopy	Broad-leaved deciduous tree	<i>Quercus velutina</i> (black oak)
Shrub/sapling (tall & short)	Broad-leaved deciduous tree	<i>Cornus florida</i> (flowering dogwood)
Shrub/sapling (tall & short)	Broad-leaved deciduous shrub	<i>Viburnum acerifolium</i> (mapleleaf viburnum)
Short shrub/sapling	Broad-leaved deciduous shrub	<i>Gaylussacia baccata</i> (black huckleberry)
Herb (field)	Graminoid	<i>Carex pensylvanica</i> (Pennsylvania sedge)

## SOUTHERN RED OAK / HEATH FOREST

*Quercus alba* - *Quercus falcata* - (*Pinus taeda*) / *Gaylussacia frondosa* Forest

**Range:** This association occurs on the Coastal Plain from New Jersey to Virginia and possibly northeastern North Carolina. In central and southeastern Virginia, it extends slightly into the eastern portion of the Piedmont.

**Environmental Description:** This community generally occurs on well-drained acidic soils, primarily loamy sands, sandy loams and silty/clay loams. Occasional stands occur on imperfectly drained, alternately wet and dry, upland flats with hardpan subsoils. Even on the latter, moisture potential of most sites supporting this vegetation can be characterized as subxeric to xeric. Soil samples collected from plots of this vegetation type in Virginia are extremely acidic, with very low base cation levels and total base saturation.

**Vegetation Description:** Physiognomy is generally a closed to somewhat open forest. The overstory of mid- to late-successional stands is dominated by a mixture of oaks, such as *Quercus alba* (white oak), *Quercus falcata* (southern red oak), and *Quercus velutina* (black oak). Early-successional stands recovering from recent logging or agricultural conversion usually have a strong admixture of *Pinus taeda* (loblolly pine). Other canopy associates include *Sassafras albidum* (sassafras), *Quercus coccinea* (scarlet oak) (occasionally codominant), *Quercus stellata* (post oak), *Liquidambar styraciflua* (sweetgum), *Nyssa sylvatica* (blackgum), *Carya alba* (mockernut hickory), and *Carya pallida* (sand hickory) (occasionally codominant). *Acer rubrum* (red maple), *Ilex opaca* (American holly), and *Cornus florida* (flowering dogwood) are the principal subcanopy trees. In the southern part of the range, *Oxydendrum arboreum* (sourwood) and scrambling vines of *Vitis rotundifolia* (muscadine) can be important in the understory. The shrub layer is well-developed and dominated by ericaceous species such as *Gaylussacia*

*baccata* (black huckleberry), *Gaylussacia frondosa* (dangleberry), *Vaccinium pallidum* (hillside blueberry), *Vaccinium stamineum* (deerberry), and occasionally *Lyonia mariana* (piedmont staggerbush). The herbaceous layer is generally sparse and characterized by xerophytes such as *Pteridium aquilinum* (bracken fern), *Cypripedium acaule* (pink lady's-slipper), *Chimaphila maculata* (striped pipsissewa), and *Gaultheria procumbens* (wintergreen).

**Characteristic Species:** *Gaylussacia frondosa* (dangleberry), *Pteridium aquilinum* (bracken fern)

**Dynamics/Successional Trajectory:** Periodic fire is presumably an important natural disturbance in this type that encourages oak regeneration. Many Virginia stands of this type now have poor oak recruitment and understories dominated by young *Acer rubrum* (red maple) and/or *Fagus grandifolia* (American beech), presumably because of fire exclusion. The relative cover of *Pinus taeda* (loblolly pine) is likely related to disturbance history, with higher pine cover suggesting more recent disturbance.

**Management Concerns:** Mature examples are uncommon, and all stands are vulnerable to logging disturbances and fire suppression.

**Reference Sites:** Milford Neck, DE; Prime Hook, DE; Maurice River and Manumuskin River, NJ

**Global and State Conservation Ranks and Reasons:** G4G5 (1-Dec-1997). DE: SNR, NJ: S3S4. The type is common and widespread on the Coastal Plain from New Jersey to Virginia. Mature examples are uncommon, and all stands are vulnerable to logging disturbances and fire suppression.

**VegBank Link for Plot Data:** [http://vegbank.org/natureserve/element\\_global.2.689304](http://vegbank.org/natureserve/element_global.2.689304)

**References:** Breden 1989, Breden et al. 2001, Eastern Ecology Working Group n.d., Fleming et al. 2001, Fleming pers. comm., Harrison 2004, Shreve et al. 1910, Sneddon et al. 1996, VDNH 2003

MOST ABUNDANT SPECIES		
STRATUM	LIFEFORM	SPECIES
Tree canopy	Broad-leaved deciduous tree	<i>Quercus alba</i> (white oak)
Tree canopy	Broad-leaved deciduous tree	<i>Quercus coccinea</i> (scarlet oak)
Tree canopy	Broad-leaved deciduous tree	<i>Quercus falcata</i> (southern red oak)
Short shrub/sapling	Broad-leaved deciduous shrub	<i>Gaylussacia baccata</i> (black huckleberry)
Short shrub/sapling	Broad-leaved deciduous shrub	<i>Vaccinium pallidum</i> (hillside blueberry)
Herb (field)	Fern or fern ally	<i>Pteridium aquilinum</i> (bracken fern)

### XERIC PALEODUNE OAK - SAND HICKORY WOODLAND

*Quercus (alba, velutina, stellata, falcata) / Carya pallida - Quercus prinoides / Carex pensylvanica*  
Woodland

**Range:** This community occurs along the Maurice River in New Jersey within the Delaware Estuary.

**Environmental Description:** This is a rare community that is unique to xeric paleodunes (Evesboro Soils) on Maurice River terraces.

**Vegetation Description:** Dominant trees include various combinations of *Quercus falcata* (southern red oak), *Quercus alba* (white oak), *Quercus velutina* (black oak), and *Quercus stellata* (post oak), with smaller amounts of *Sassafras albidum* (sassafras), *Carya pallida* (sand hickory), and *Pinus rigida* (pitch pine). Low shrubs occurring in small patches include *Gaylussacia baccata* (black huckleberry) and *Vaccinium pallidum* (hillside blueberry), while taller shrubs in small patches or as scattered individuals include *Quercus ilicifolia* (bear oak), *Quercus prinoides* (dwarf chinquapin oak), *Quercus stellata* (post oak), *Gaylussacia frondosa* (dangleberry), *Carya pallida* (sand hickory), and rarely *Cornus florida* (flowering dogwood). *Smilax glauca* (whiteleaf greenbrier) also occurs as scattered individuals. *Carex pensylvanica* (Pennsylvania sedge) forms a widespread herb stratum with 50-75% cover. Other herbs include *Cladina subtenuis* (dixie reindeer lichen) and *Schizachyrium scoparium* (little bluestem).

**Characteristic Species:** *Carya pallida* (sand hickory)

**Reference Sites:** Maurice River, Unexpected Preserve, NJ

**Global and State Conservation Ranks and Reasons:** GNR (8-Nov-2000). NJ: SNR.

**VegBank Link for Plot Data:** [http://vegbank.org/natureserve/element\\_global.2.688129](http://vegbank.org/natureserve/element_global.2.688129)

**References:** Eastern Ecology Working Group n.d.

<b>MOST ABUNDANT SPECIES</b>		
<b>STRATUM</b>	<b>LIFEFORM</b>	<b>SPECIES</b>
Tree canopy	Broad-leaved deciduous tree	<i>Quercus alba</i> (white oak)
Tree canopy	Broad-leaved deciduous tree	<i>Quercus falcata</i> (southern red oak)
Tree canopy	Broad-leaved deciduous tree	<i>Quercus stellata</i> (post oak)
Tree canopy	Broad-leaved deciduous tree	<i>Quercus velutina</i> (black oak)
Short shrub/sapling	Broad-leaved deciduous shrub	<i>Gaylussacia baccata</i> (black huckleberry)
Herb (field)	Graminoid	<i>Carex pensylvanica</i> (Pennsylvania sedge)