

14270

East Gulf Coastal Plain Jackson Plain Prairie and Barrens

BpS Model/Description Version: Aug. 2020

Modelers		Reviewers	
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Vegetation Type

Herbaceous

Map Zones

47

Geographic Range

This ecological system was locally dominant in the Jackson Purchase area of western KY, extending into limited areas of adjacent TN. This central region, called "The Barrens," has been historically subdivided from the rest of the Coastal Plain region of KY (Davis 1923, Bryant and Martin 1988). This is primarily in Graves County and parts of adjacent Calloway County, extending into limited areas of adjacent TN.

Biophysical Site Description

These grassy barren communities occur on soils are predominantly thin, well-drained, and gravelly, lying atop flat upland terrain in the Jackson Purchase area of western KY, extending into limited areas of adjacent TN. This central region, called "the Barrens," has been historically subdivided from the rest of the Coastal Plain region of KY (Davis 1923, Bryant and Martin 1988). The former barrens were on flat to gently rolling lands just to the dry side of the moisture gradient (Bryant and Held 2001). These lands are flat and composed of drought-prone materials whose structure and composition serves to retard woody plant growth and reproductive success. The topography is flat to gently sloping. Some proposed factors which have functioned to maintain the openness of these areas include the soil/geology as well as fire, natural and managed grazing, and modern anthropogenic factors such as mowing for hay, etc. This system likely did not develop on the deeper loess soils of the region.

Vegetation Description

Stands may vary in physiognomy from savanna-grasslands to oak-dominated woodlands and forests. Many stands are in a forested condition today due to lack of fire. Most examples were presumably dry to dry-mesic in moisture status, with little bluestem (*Schizachyrium scoparium*) and Indian grass (*Sorghastrum nutans*) being prominent components. Woody species include the relatively fire-tolerant oaks *Quercus stellata*, *Quercus alba*, and *Quercus marilandica*, along with *Quercus falcata*, *Acer rubrum*, *Diospyros virginiana*, *Sassafras albidum*, *Rhus copallinum*, *Rubus argutus*, and *Smilax glauca*.

BpS Dominant and Indicator Species

Symbol	Scientific Name	Common Name
QUAL	<i>Quercus alba</i>	White oak

QUST	<i>Quercus stellata</i>	Post oak
QUMA3	<i>Quercus marilandica</i>	Blackjack oak
ANGE	<i>Andropogon gerardii</i>	Big bluestem
SONU2	<i>Sorghastrum nutans</i>	Indiangrass
PAVI2	<i>Panicum virgatum</i>	Switchgrass
SCSC	<i>Schizachyrium scoparium</i>	Little bluestem

Species names are from the NRCS PLANTS database. Check species codes at <http://plants.usda.gov>.

Disturbance Description

Past fire and grazing constitute the major dynamic processes for this region. Fires were frequent (potentially on a five-year return interval), primarily of human origin, and are thought to have occurred in late summer to early autumn prior to European settlement. Some proposed factors which have functioned to maintain the openness of this system following the reduction of fire frequency include the droughty, gravelly soils and resulting stresses to vegetation, as well as more occasional fire. Fralish et al. (1999) noted that both post oak and chestnut oak woodlands are essentially the result of fire suppression in the barrens and historic savannas. In some areas, where the soils are particularly harsh (droughty, nutrient-poor, rocky), stands may retain an open aspect in the absence of fire. Some of the extant examples are largely dependent on contemporary management regimes.

Fire Frequency

Severity	Avg FI	Percent of All Fires	Min FI	Max FI
Replacement	18	33		
Moderate (Mixed)	34	17		
Low (Surface)	12	50		
All Fires	6	100		

Fire interval is expressed in years for each fire severity class and for all types of fire combined (All Fires). Average FI is the central tendency modeled. Percent of all fires is the percent of all fires modeled in that severity class. Minimum and Maximum FIs show the relative range of fire intervals as estimated by model contributors, if known.

Scale Description

Under pre-settlement conditions, this system was presumably one which predominated on larger flat and convex fire compartments; these were interspersed with forested systems on the more concave and slightly fire-sheltered topographic surfaces. The relationship between these systems (prairie and barrens versus dry-mesic forest) is a complex one and their relative proportion of the landscape would have shifted under different conditions of climate, human population density, and human cultural practices related to the use of fire for agriculture and game management. It is classed as a "large patch" system today, but larger examples are rare if they exist at all, primarily due to its fragmentation by agriculture and fire suppression.

Adjacency or Identification Concerns

There are old fields and anthropogenic areas which can mimic legitimate examples of this system, and conversely there are areas which will appear forested which are actually fire-suppressed examples of the system which have dense woody vegetation instead of grasses. The component associations of this system are poorly known since so few extant examples remain. The best remaining examples may be found in the West KY Wildlife Management Area (M. Evans pers. comm.). This system extends, at least historically, into adjacent Henry County, TN, interpreted from the occurrence of several barrens plant species (M. Pyne pers. obs.).

Issues or Problems

While many of the native common plant species still occur in the current barren/prairie/savanna physiognomy-dominated stands, lack of natural disturbance regimes impact herbaceous species competition and abundance. The vegetation tends to be driven either to grassland herbaceous (partly by mowing) or closed-canopy forest, leading to the loss of the natural woodland-savanna (barrens) matrix. This BpS is very similar in its composition and dynamics to the Western Highland Rim Prairie and Barrens, ESP 1416.

Native Uncharacteristic Conditions

These former barrens and prairies often become filled in with woody vegetation (e.g. red maple, sweetgum, persimmon, sassafras, and oak and hickory species) due to fire suppression. Pines are not typically found in this region, but loblolly pine may have been planted for commercial forestry and can spread from these stands. White oak, post oak, and to a lesser extent blackjack oak woodlands and forests often “fill in” with less fire tolerant species (e.g. southern red oak, scarlet oak, red maple, sweetgum, blackgum, etc.), resulting in a closed canopy forest.

Comments

Succession Classes

Mapping Rules

Upper Layer Lifeform	Height (m)	Canopy Cover (%)									
		0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100
Herb	0-0.5	A	A	A	A	A	A	A	A	A	A
Herb	0.5-1.0	A	A	A	A	A	A	A	A	A	A
Herb	>1.0	A	A	A	A	A	A	A	A	A	A
Shrub	0-0.5	UN	UN	UN	UN	UN	UN	B	B	B	B
Shrub	0.5-1.0	UN	UN	UN	UN	UN	UN	B	B	B	B
Shrub	1.0-3.0	UN	UN	UN	UN	UN	UN	B	B	B	B
Shrub	>3.0	UN	UN	UN	UN	UN	UN	UN	UN	UN	UN
Tree	0-5	UN	UN	C	C	C	C	UN	UN	UN	UN
Tree	5-10	UN	UN	C	C	C	C	UN	UN	UN	UN
Tree	10-25	UN	UN	D	D	D	D	E	E	UN	UN
Tree	25-50	UN	UN	UN	UN	UN	UN	UN	UN	UN	UN
Tree	>50	UN	UN	UN	UN	UN	UN	UN	UN	UN	UN

Succession class letters A-E are described in the Succession Class Description section. Some classes use a leafform distinction where a qualifier is added to the class letter: Brdl (broadleaf), Con (conifer), or Mix (mixed conifer and broadleaf). UN refers to uncharacteristic native or a combination of height and cover that would not be expected under the reference condition. NP refers to not possible or a combination of height and cover which is not physiologically possible for the species in the BpS.

Description

Class A	43	Early Development 1 - All Structures
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Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
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Description

This class represents a young savanna/prairie complex. This system is similar to Late Open, except with widely spaced younger trees (e.g. *Quercus alba* and *Quercus stellata*). Grass and forb species remain the same. Shrub species include climbing rose (*Rosa setigera*), and winged sumac (*Rhus copallinum*).

Maximum Tree Size Class

Very Large >33" DBH

Class D	30	Late Development 1 - Open
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Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
QUST	<i>Quercus stellata</i>	Post oak	Upper
QUAL	<i>Quercus alba</i>	White oak	Upper
ANGE	<i>Andropogon gerardii</i>	Big bluestem	Lower
SCSC	<i>Schizachyrium scoparium</i>	Little bluestem	Lower

Description

This class represents a savanna/prairie complex. This system is similar to early development, except with widely dispersed open-grown trees (i.e. *Quercus alba* and *Quercus stellata*) with significant DBH. Grass and forb species remain the same. Coverage of grasses and forbs may exceed that of trees. Shrubs are very limited. Shrub species include climbing rose (*Rosa setigera*) and winged sumac (*Rhus copallinum*).

Maximum Tree Size Class

Very Large >33" DBH

Class E	8	Late Development 1 - Closed
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Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
QUAL	<i>Quercus alba</i>	White oak	Upper
QUFA	<i>Quercus falcata</i>	Southern red oak	Mid-Upper
ACRU	<i>Acer rubrum</i>	Red maple	Middle
VACCI	<i>Vaccinium</i>	Blueberry	Lower

Description

This class represents closed canopy forest and oak litter-blueberry (*Vaccinium* spp.) dominated woodlands. Older white oak and post oak remain co-dominant, with younger individuals of southern red oak, scarlet oak, red maple, and sweetgum filling in and closing the understory, and eventually reaching the canopy and filling in the gaps between the older trees. These trees will ultimately dominate the canopy as the older trees senesce and die. *Vaccinium*, *Rhododendron*,

and seedlings of less fire tolerant species comprise the shrub layer. Sourwood and blackgum are also common. Other shrub species include winged sumac (*Rhus copallinum*) and prairie rose (*Rosa setigera*).

Maximum Tree Size Class

Very Large >33" DBH

Model Parameters

Deterministic Transitions

From Class	Begins at (yr)	Succeeds to	After (years)
Early1:ALL	0	Mid1:OPN	14
Mid1:OPN	15	Late1:OPN	59
Mid1:CLS	15	Late1:OPN	59
Late1:OPN	60	Late1:OPN	999
Late1:CLS	60	Late1:CLS	999

Probabilistic Transitions

Disturbance Type	Disturbance occurs In	Moves vegetation to	Disturbance Probability	Return Interval (yrs)	Reset Age to New Class Start Age After Disturbance?	Years Since Last Disturbance
Alternative Succession	Early1:ALL	Mid1:CLS	1	1	Yes	13
Replacement Fire	Early1:ALL	Early1:ALL	0.1	10	Yes	0
Alternative Succession	Mid1:OPN	Mid1:CLS	1	1	Yes	10
Wind or Weather or Stress	Mid1:OPN	Early1:ALL	0.0067	149	Yes	0
Replacement Fire	Mid1:OPN	Early1:ALL	0.02	50	Yes	0
Mixed Fire	Mid1:OPN	Mid1:OPN	0.05	20	No	0
Surface Fire	Mid1:OPN	Mid1:OPN	0.2	5	No	0
Alternative Succession	Mid1:CLS	Late1:CLS	1	1	Yes	20
Surface Fire	Mid1:CLS	Mid1:CLS	0.02	50	No	0
Wind or Weather or Stress	Mid1:CLS	Early1:ALL	0.02	50	Yes	0
Mixed Fire	Mid1:CLS	Mid1:OPN	0.066	15	Yes	0
Replacement Fire	Mid1:CLS	Early1:ALL	0.1	10	Yes	0
Alternative Succession	Late1:OPN	Late1:CLS	1	1	Yes	20
Wind or Weather or Stress	Late1:OPN	Early1:ALL	0.005	200	Yes	0
Replacement Fire	Late1:OPN	Early1:ALL	0.01	100	Yes	0
Mixed Fire	Late1:OPN	Late1:OPN	0.05	20	No	0
Surface Fire	Late1:OPN	Late1:OPN	0.2	5	No	0
Wind or	Late1:CLS	Late1:OPN	0.01	100	Yes	0

Weather or Stress						
Replacement Fire	Late1:CLS	Early1:ALL	0.01	100	Yes	0
Surface Fire	Late1:CLS	Late1:CLS	0.02	50	No	0
Mixed Fire	Late1:CLS	Late1:OPN	0.05	20	Yes	0

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