

	sq. km	sq. mi	FIA Plots
Area of Region	9,000.0	3,474.9	135

### Species Information

The columns below provide brief summaries of the species associated with the region and described in the table on the next pages. Definitions are provided in the Excel file for this region.

Genus	Species	Abundance		Model		Potential Change in Habitat Suitability		Capability to Cope or Persist		Migration Potential					
				Reliability	Adaptability	Scenario RCP45	Scenario RCP85	Scenario RCP45	Scenario RCP85	SHIFT RCP45	SHIFT RCP85				
Ash	2			High	23	25	Increase	24	28	Very Good	7	9	Likely	0	0
Hickory	4			Medium	26	49	No Change	10	9	Good	19	21	Infill	9	9
Maple	6	Abundant	1	Low	34	12	Decrease	21	18	Fair	8	8	Migrate	4	7
Oak	11	Common	25	FIA	6		New	20	20	Poor	6	2			
Pine	5	Rare	35				Unknown	14	14	Very Poor	15	15			
Other	33	Absent	25							FIA Only	3	3			
	<b>61</b>		<b>86</b>		<b>89</b>	<b>86</b>		<b>89</b>	<b>89</b>	Unknown	8	8			
											<b>66</b>	<b>66</b>			

### Potential Changes in Climate Variables

#### Temperature (°F)

	Scenario	2009	2039	2069	2099	
Annual Average	CCSM45	53.1	54.9	57.1	57.4	
	CCSM85	53.1	55.3	57.9	61.0	
	GFDL45	53.1	57.2	58.8	60.0	
	GFDL85	53.1	56.5	60.0	64.1	
	HAD45	53.1	55.8	59.3	60.8	
	HAD85	53.1	56.0	60.2	64.9	
Growing Season (May—Sep)	CCSM45	69.1	71.0	72.9	73.4	
	CCSM85	69.1	71.2	73.9	77.7	
	GFDL45	69.1	73.8	75.9	77.5	
	GFDL85	69.1	73.4	77.4	81.9	
	HAD45	69.1	72.2	75.4	77.4	
	HAD85	69.1	72.0	77.1	82.4	
Coldest Month Average	CCSM45	29.0	30.8	32.4	32.9	
	CCSM85	29.0	31.3	32.7	34.3	
	GFDL45	29.0	32.2	32.9	33.6	
	GFDL85	29.0	32.0	33.2	34.7	
	HAD45	29.0	30.8	33.1	33.3	
	HAD85	29.0	31.3	33.2	35.2	
Warmest Month Average	CCSM45	74.9	77.1	78.0	78.4	
	CCSM85	74.9	77.3	79.2	80.9	
	GFDL45	74.9	78.0	80.0	81.4	
	GFDL85	74.9	79.6	81.9	84.8	
	HAD45	74.9	78.4	80.5	81.7	
	HAD85	74.9	78.8	82.0	85.6	

#### Precipitation (in)

	Scenario	2009	2039	2069	2099	
Annual Total	CCSM45	41.9	45.1	46.0	48.3	
	CCSM85	41.9	45.4	47.0	52.3	
	GFDL45	41.9	47.0	49.6	49.7	
	GFDL85	41.9	43.3	49.5	50.9	
	HAD45	41.9	44.7	45.7	44.9	
	HAD85	41.9	47.6	43.4	47.2	
Growing Season (May—Sep)	CCSM45	18.9	21.7	22.2	22.9	
	CCSM85	18.9	21.5	21.8	24.0	
	GFDL45	18.9	19.8	20.6	20.8	
	GFDL85	18.9	18.0	20.1	20.5	
	HAD45	18.9	20.2	18.7	18.2	
	HAD85	18.9	20.6	17.8	18.7	

**NOTE:** For the six climate variables, four 30-year periods are used to indicate six potential future trajectories. The period ending in 2009 is based on modeled observations from the PRISM Climate Group and the three future periods were obtained from the NASA NEX-DGP30 dataset. Future climate projections from three models under two emission scenarios show estimates of each climate variable within the region. The three models are CCSM4, GFDL CM3, and HadGEM2-ES and the emission scenarios are the 4.5 and 8.5 RCP. The average value for the region is reported, even though locations within the region may vary substantially based on latitude, elevation, land-use, or other factors.

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# Catoctin Mountain Park

## National Park Climate Change Atlas Tree Species

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### Current and Potential Future Habitat, Capability, and Migration

Common Name	Scientific Name	Range	MR	%Cell	FIAsum	FIAiv	ChngCl45	ChngCl85	Adap	Abund	Capabil45	Capabil85	SHIFT45	SHIFT85	SSO	N
chestnut oak	Quercus prinus	NDH	High	56.7	774.4	22.0	Lg. dec.	Lg. dec.	High	Abundant	Good	Good			2	1
red maple	Acer rubrum	WDH	High	51.1	457.3	11.3	Sm. dec.	Sm. dec.	High	Common	Fair	Fair	Infill +	Infill +	2	2
yellow-poplar	Liriodendron tulipifera	WDH	High	36.7	422.4	15.3	Sm. dec.	Sm. dec.	High	Common	Fair	Fair	Infill +	Infill +	2	3
black cherry	Prunus serotina	WDL	Medium	60	403.8	10.5	Sm. dec.	Sm. dec.	Low	Common	Poor	Poor	Infill +	Infill +	2	4
white oak	Quercus alba	WDH	Medium	53.3	281.2	9.4	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good			2	5
white ash	Fraxinus americana	WDL	Medium	48.9	260.4	8.8	No change	No change	Low	Common	Poor	Poor	Infill +	Infill +	2	6
northern red oak	Quercus rubra	WDH	Medium	53.3	241.4	8.2	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good			2	7
black locust	Robinia pseudoacacia	NDH	Low	33.3	207.3	9.2	Sm. dec.	No change	Medium	Common	Poor	Fair	Infill +	Infill +	2	8
black oak	Quercus velutina	WDH	High	43.3	186.4	8.0	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			2	9
pignut hickory	Carya glabra	WDL	Medium	45.6	182.8	7.4	No change	No change	Medium	Common	Fair	Fair	Infill +	Infill +	2	10
black walnut	Juglans nigra	WDH	Low	30	173.5	8.9	No change	No change	Medium	Common	Fair	Fair	Infill +	Infill +	2	11
sweet birch	Betula lenta	NDH	High	22.2	168.9	9.3	Lg. dec.	Lg. dec.	Low	Common	Very Poor	Very Poor			0	12
blackgum	Nyssa sylvatica	WDL	Medium	40	158.4	7.1	No change	Sm. inc.	High	Common	Good	Very Good			2	13
eastern redcedar	Juniperus virginiana	WDH	Medium	15.6	143.1	17.4	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			2	14
ailanthus	Ailanthus altissima	NSL	FIA	32.2	140.6	6.5	Unknown	Unknown	NA	Common	NNIS	NNIS			0	15
eastern white pine	Pinus strobus	WDH	High	13.3	132.8	13.4	Lg. dec.	Lg. dec.	Low	Common	Very Poor	Very Poor			2	16
hackberry	Celtis occidentalis	WDH	Medium	15.6	116.9	7.5	Sm. dec.	No change	High	Common	Fair	Good			2	17
mockernut hickory	Carya alba	WDL	Medium	33.3	87.1	4.8	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			2	18
boxelder	Acer negundo	WSH	Low	20	83.2	10.6	No change	Sm. inc.	High	Common	Good	Very Good			2	19
bitternut hickory	Carya cordiformis	WSL	Low	16.7	82.5	9.0	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good			2	20
sassafras	Sassafras albidum	WSL	Low	30	75.6	3.9	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			2	21
American beech	Fagus grandifolia	WDH	High	11.1	68.7	6.2	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			2	22
scarlet oak	Quercus coccinea	WDL	Medium	20	65.6	4.1	Sm. inc.	No change	Medium	Common	Good	Fair		Infill +	2	23
shagbark hickory	Carya ovata	WSL	Medium	26.7	55.8	4.4	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			2	24
silver maple	Acer saccharinum	NSH	Low	11.1	54.3	20.0	Sm. dec.	No change	High	Common	Fair	Good			0	25
sycamore	Platanus occidentalis	NSL	Low	12.2	54.2	6.2	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			2	26
sugar maple	Acer saccharum	WDH	High	8.9	45.8	5.2	Sm. inc.	Sm. inc.	High	Rare	Good	Good			2	27
Virginia pine	Pinus virginiana	NDH	High	18.9	43.0	5.7	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	28
eastern hemlock	Tsuga canadensis	NSH	High	5.6	33.4	6.0	Sm. dec.	Lg. dec.	Low	Rare	Very Poor	Very Poor			2	29
Norway maple	Acer platanoides	NSL	FIA	6.7	29.2	8.9	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	30
American basswood	Tilia americana	WSL	Medium	7.8	29.1	3.8	No change	Sm. dec.	Medium	Rare	Poor	Very Poor			0	31
red mulberry	Morus rubra	NSL	Low	10	17.9	10.7	Lg. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	32
white mulberry	Morus alba	NSL	FIA	7.8	16.0	6.7	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	33
American elm	Ulmus americana	WDH	Medium	20	14.5	2.3	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	34
pitch pine	Pinus rigida	NSH	High	4.4	12.7	2.9	Sm. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	35
yellow birch	Betula alleghaniensis	NDL	High	1.1	10.9	9.8	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	36
serviceberry	Amelanchier spp.	NSL	Low	12.2	10.2	1.2	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	37
eastern hophornbeam; ironw	Ostrya virginiana	WSL	Low	13.3	10.0	1.9	Lg. inc.	Lg. inc.	High	Rare	Good	Good			2	38
Osage-orange	Maclura pomifera	NDH	Medium	1.1	8.8	8.0	Sm. dec.	No change	High	Rare	Poor	Fair			0	39
slippery elm	Ulmus rubra	WSL	Low	7.8	8.7	2.3	Sm. inc.	Lg. inc.	Medium	Rare	Fair	Good	Infill +		2	40
eastern redbud	Cercis canadensis	NSL	Low	13.3	8.3	1.5	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	41
flowering dogwood	Cornus florida	WDL	Medium	20	7.7	0.9	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	42
pawpaw	Asimina triloba	NSL	Low	7.8	7.5	2.0	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	43
honeylocust	Gleditsia triacanthos	NSH	Low	2.2	7.5	3.4	No change	Sm. inc.	High	Rare	Fair	Good			2	44
common persimmon	Diospyros virginiana	NSL	Low	1.1	7.3	6.6	Sm. inc.	Lg. inc.	High	Rare	Good	Good			2	45
pin oak	Quercus palustris	NSH	Low	8.9	6.0	10.9	No change	No change	Low	Rare	Very Poor	Very Poor			2	46
green ash	Fraxinus pennsylvanica	WSH	Low	5.6	6.0	3.4	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	47



Current and Potential Future Habitat, Capability, and Migration

Common Name	Scientific Name	Range	MR	%Cell	FIAsum	FIAiv	ChngCl45	ChngCl85	Adap	Abund	Capabil45	Capabil85	SHIFT45	SHIFT85	SSO	N
swamp chestnut oak	Quercus michauxii	NSL	Low	6.7	5.7	2.1	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	48
butternut	Juglans cinerea	NSLX	FIA	1.1	5.5	4.9	Unknown	Unknown	Low	Rare	FIA Only	FIA Only			0	49
swamp white oak	Quercus bicolor	NSL	Low	4.4	4.5	16.3	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	50
loblolly pine	Pinus taeda	WDH	High	1.1	3.9	3.5	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	51
American hornbeam; musclev	Carpinus caroliniana	WSL	Low	4.4	3.9	0.9	No change	Lg. inc.	Medium	Rare	Poor	Good	Infill +		2	52
striped maple	Acer pensylvanicum	NSL	Medium	1.1	3.8	3.4	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	53
black willow	Salix nigra	NSH	Low	1.1	3.7	3.4	No change	Lg. inc.	Low	Rare	Very Poor	Fair		Infill +	2	54
chinkapin oak	Quercus muehlenbergii	NSL	Medium	1.1	2.7	2.5	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	55
cucumbertree	Magnolia acuminata	NSL	Low	2.2	2.6	1.2	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	56
shortleaf pine	Pinus echinata	WDH	High	1.1	1.8	1.7	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	57
chokecherry	Prunus virginiana	NSLX	FIA	1.1	1.8	1.6	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	58
southern red oak	Quercus falcata	WDL	Medium	4.4	0.6	2.1	Lg. inc.	Lg. inc.	High	Rare	Good	Good			2	59
white spruce	Picea glauca	NSL	Medium	4.4	0.4	1.5	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	60
bear oak; scrub oak	Quercus ilicifolia	NSLX	FIA	4.4	0.2	0.7	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	61
ashe juniper	Juniperus ashei	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			0	62
red spruce	Picea rubens	NDH	High	0	0	0	Unknown	Unknown	Low	Absent	Unknown	Unknown			0	63
bald cypress	Taxodium distichum	NSH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	64
florida maple	Acer barbatum	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat		Migrate +	3	65
mountain maple	Acer spicatum	NSL	Low	0	0	0	Unknown	Unknown	High	Absent	Unknown	Unknown			0	66
river birch	Betula nigra	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +	3	67
cittamwood/gum bumelia	Sideroxylon lanuginosum ssp.	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			0	68
pecan	Carya illinoensis	NSH	Low	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat			3	69
shellbark hickory	Carya laciniosa	NSL	Low	0	0	0	Unknown	Unknown	Medium	Modeled	Unknown	Unknown			0	70
black hickory	Carya texana	NDL	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			0	71
sugarberry	Celtis laevigata	NDH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	72
sweetgum	Liquidambar styraciflua	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate ++	Migrate ++	3	73
bigleaf magnolia	Magnolia macrophylla	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	74
sourwood	Oxydendrum arboreum	NDL	High	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	75
redbay	Persea borbonia	NSL	Low	0	0	0	Unknown	Unknown	High	Absent	Unknown	Unknown			0	76
quaking aspen	Populus tremuloides	WDH	High	0	0	0	Unknown	Unknown	Medium	Modeled	Unknown	Unknown			0	77
pin cherry	Prunus pensylvanica	NSL	Low	0	0	0	Unknown	Unknown	Medium	Modeled	Unknown	Unknown			0	78
cherrybark oak; swamp red o	Quercus pagoda	NSL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	79
overcup oak	Quercus lyrata	NSL	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat			3	80
blackjack oak	Quercus marilandica	NSL	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			3	81
water oak	Quercus nigra	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +	3	82
willow oak	Quercus phellos	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	83
Shumard oak	Quercus shumardii	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			3	84
post oak	Quercus stellata	WDH	High	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate ++	Migrate ++	3	85
live oak	Quercus virginiana	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			0	86
bluejack oak	Quercus incana	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	87
winged elm	Ulmus alata	WDL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate ++	3	88
cedar elm	Ulmus crassifolia	NDH	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat			0	89