

Fredericksburg and Spotsylvania County Battlefields Memorial National Park Climate Change Atlas Tree Species

USDA Forest Service
Northern Research Station
Landscape Change Research Group
Iverson, Peters, Prasad, Matthews

Current and Potential Future Habitat, Capability, and Migration

sq. km sq. mi FIA Plots
Area of Region 8,577.9 3,312.0 246

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	Scenario	Scenario	Scenario	SHIFT	SHIFT				
				High	22	21	Increase	25	29	Very Good	7	10	Likely	0	0
Ash	2			Medium	34	50	No Change	8	10	Good	20	19	Infill	32	32
Hickory	4			Low	30	15	Decrease	31	25	Fair	8	12	Migrate	2	6
Maple	3	Abundant	6	FIA	2		New	15	17	Poor	12	8			
Oak	14	Common	19				Unknown	9	7	Very Poor	12	11			
Pine	6	Rare	41							FIA Only	0	0			
Other	37	Absent	20							Unknown	7	5			
	66		86		88	86		88	88		66	65		34	38

Potential Changes in Climate Variables

Temperature (°F)

Scenario	2009	2039	2069	2099	
Annual	56.4	58.1	60.3	60.5	
Average	56.4	58.5	61.0	64.0	
GFDL45	56.4	59.0	61.7	62.8	
GFDL85	56.4	59.5	62.9	66.8	
HAD45	56.4	58.8	62.1	63.4	
HAD85	56.4	59.0	62.9	67.3	
Growing Season	71.7	73.5	75.3	75.8	
May—Sep	71.7	73.7	76.4	80.1	
GFDL45	71.7	74.6	77.9	79.4	
GFDL85	71.7	75.6	79.4	83.7	
HAD45	71.7	74.4	77.5	79.2	
HAD85	71.7	74.4	79.1	83.9	
Coldest Month	33.4	35.5	36.7	37.1	
Average	33.4	36.1	37.2	38.6	
GFDL45	33.4	36.7	37.2	37.8	
GFDL85	33.4	36.0	37.0	38.4	
HAD45	33.4	34.9	36.8	37.1	
HAD85	33.4	35.2	36.8	38.6	
Warmest Month	77.3	79.5	80.4	80.6	
Average	77.3	79.5	81.5	83.0	
GFDL45	77.3	80.4	82.0	83.4	
GFDL85	77.3	81.8	83.8	86.4	
HAD45	77.3	80.5	82.5	83.5	
HAD85	77.3	80.9	83.8	87.0	

Precipitation (in)

Scenario	2009	2039	2069	2099	
Annual	43.0	47.0	50.2	49.8	
Total	43.0	47.8	49.3	56.5	
GFDL45	43.0	47.9	51.2	52.2	
GFDL85	43.0	44.9	51.3	52.5	
HAD45	43.0	45.7	46.8	45.4	
HAD85	43.0	49.4	45.2	48.0	
Growing Season	19.6	23.4	25.0	24.8	
May—Sep	19.6	23.1	23.9	27.5	
GFDL45	19.6	21.0	22.7	23.2	
GFDL85	19.6	19.5	22.6	23.1	
HAD45	19.6	21.8	20.7	19.1	
HAD85	19.6	22.2	19.3	20.1	

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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Common Name	Scientific Name	Range	MR	%Cell	FIAsum	FIAiv	ChngCl45	ChngCl85	Adap	Abund	Capabil45	Capabil85	SHIFT45	SHIFT85	SSO	N
yellow-poplar	Liriodendron tulipifera	WDH	High	85.9	1357.4	14.8	Lg. dec.	Lg. dec.	High	Abundant	Good	Good	Infill ++		2	1
loblolly pine	Pinus taeda	WDH	High	48	1289.3	25.8	Sm. inc.	Lg. inc.	Medium	Abundant	Very Good	Very Good	Infill ++	Infill ++	2	2
white oak	Quercus alba	WDH	Medium	79.4	1063.8	12.7	Sm. dec.	Sm. dec.	High	Abundant	Good	Good	Infill ++	Infill ++	2	3
Virginia pine	Pinus virginiana	NDH	High	78.3	929.3	11.4	Lg. dec.	Lg. dec.	Medium	Abundant	Fair	Fair	Infill +	Infill +	2	4
red maple	Acer rubrum	WDH	High	82.8	717.7	8.1	No change	No change	High	Abundant	Very Good	Very Good	Infill ++	Infill ++	2	5
sweetgum	Liquidambar styraciflua	WDH	High	62.4	647.7	9.5	Lg. inc.	Lg. inc.	Medium	Abundant	Very Good	Very Good	Infill ++	Infill ++	2	6
southern red oak	Quercus falcata	WDL	Medium	64.6	446.4	6.4	No change	Sm. inc.	High	Common	Good	Very Good	Infill ++	Infill ++	2	7
American beech	Fagus grandifolia	WDH	High	57.4	421.1	6.6	Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor	Infill +	Infill +	2	8
blackgum	Nyssa sylvatica	WDL	Medium	77.2	273.4	3.0	No change	Sm. inc.	High	Common	Good	Very Good	Infill ++	Infill ++	2	9
eastern redcedar	Juniperus virginiana	WDH	Medium	57.6	270.1	4.6	Sm. inc.	Sm. inc.	Medium	Common	Good	Good	Infill ++	Infill ++	2	10
pignut hickory	Carya glabra	WDL	Medium	66.7	268.9	3.9	Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor	Infill +		2	11
black oak	Quercus velutina	WDH	High	56.1	263.6	4.3	No change	No change	Medium	Common	Fair	Fair	Infill +	Infill +	2	12
chestnut oak	Quercus prinus	NDH	High	21.6	217.8	8.8	Lg. dec.	Lg. dec.	High	Common	Fair	Fair	Infill +	Infill +	2	13
American holly	Ilex opaca	NSL	Medium	49.6	210.9	3.6	Sm. dec.	No change	Medium	Common	Poor	Fair	Infill +	Infill +	2	14
scarlet oak	Quercus coccinea	WDL	Medium	51.3	202.2	3.8	Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor	Infill +	Infill +	2	15
mockernut hickory	Carya alba	WDL	Medium	57.1	175.7	3.0	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good	Infill ++	Infill ++	2	16
northern red oak	Quercus rubra	WDH	Medium	43.4	158.3	3.5	Sm. dec.	Sm. dec.	High	Common	Fair	Fair	Infill +	Infill +	2	17
black cherry	Prunus serotina	WDL	Medium	43	111.5	2.6	Lg. inc.	Lg. inc.	Low	Common	Good	Good	Infill ++	Infill ++	2	18
willow oak	Quercus phellos	NSL	Low	31.9	101.1	2.9	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good	Infill ++	Infill ++	2	19
green ash	Fraxinus pennsylvanica	WSH	Low	18.7	96.4	5.2	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good	Infill ++	Infill ++	2	20
post oak	Quercus stellata	WDH	High	23.8	93.8	3.6	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			2	21
black locust	Robinia pseudoacacia	NDH	Low	16.8	82.6	4.5	Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor			0	22
American hornbeam; muscle	Carpinus caroliniana	WSL	Low	30	80.6	2.7	Sm. inc.	Lg. inc.	Medium	Common	Good	Very Good	Infill ++	Infill ++	2	23
white ash	Fraxinus americana	WDL	Medium	21.8	68.7	3.0	Sm. inc.	Sm. inc.	Low	Common	Fair	Fair	Infill +	Infill +	2	24
flowering dogwood	Cornus florida	WDL	Medium	44	53.3	1.2	Sm. inc.	Sm. inc.	Medium	Common	Good	Good	Infill ++	Infill ++	2	25
river birch	Betula nigra	NSL	Low	19.8	49.1	2.5	Sm. inc.	Lg. inc.	Medium	Rare	Fair	Good		Infill ++	2	26
black walnut	Juglans nigra	WDH	Low	10.5	47.8	4.6	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			2	27
ailanthus	Ailanthus altissima	NSL	FIA	7	47.0	6.7	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	28
eastern redbud	Cercis canadensis	NSL	Low	4.7	43.2	9.3	Sm. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			2	29
hackberry	Celtis occidentalis	WDH	Medium	10.3	41.9	4.0	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor	Infill +	Infill +	2	30
pin oak	Quercus palustris	NSH	Low	7	41.1	5.9	Sm. dec.	Sm. dec.	Low	Rare	Very Poor	Very Poor			2	31
eastern white pine	Pinus strobus	WDH	High	3.5	37.8	10.8	Lg. dec.	Very Lg. dec.	Low	Rare	Very Poor	Lost			0	32
boxelder	Acer negundo	WSH	Low	5.8	36.2	6.2	Sm. dec.	No change	High	Rare	Poor	Fair	Infill +	Infill +	2	33
bigtooth aspen	Populus grandidentata	NSL	Medium	17.5	36.0	2.1	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	34
American elm	Ulmus americana	WDH	Medium	15.2	30.5	2.0	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	35
sycamore	Platanus occidentalis	NSL	Low	10.5	30.2	2.9	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	2	36
bitternut hickory	Carya cordiformis	WSL	Low	7	26.3	3.8	No change	No change	High	Rare	Fair	Fair	Infill +	Infill +	2	37
sweet birch	Betula lenta	NDH	High	5.8	21.6	3.7	Lg. dec.	Lg. dec.	Low	Rare	Very Poor	Very Poor			0	38
shortleaf pine	Pinus echinata	WDH	High	15.2	20.4	1.3	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	2	39
common persimmon	Diospyros virginiana	NSL	Low	16	18.3	1.1	Sm. dec.	Lg. inc.	High	Rare	Poor	Good	Infill +	Infill ++	2	40
sassafras	Sassafras albidum	WSL	Low	15.4	12.3	0.6	Very Lg. dec.	Sm. dec.	Medium	Rare	Lost	Very Poor			0	41
cherrybark oak; swamp red o	Quercus pagoda	NSL	Medium	2.8	12.2	2.8	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	42
eastern hemlock	Tsuga canadensis	NSH	High	1.2	11.3	9.7	Very Lg. dec.	Very Lg. dec.	Low	Rare	Lost	Lost			0	43
slippery elm	Ulmus rubra	WSL	Low	7	10.7	1.5	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	44
pawpaw	Asimina triloba	NSL	Low	5.5	8.9	1.3	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	45
pin cherry	Prunus pensylvanica	NSL	Low	1.2	8.6	7.4	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	46
sourwood	Oxydendrum arboreum	NDL	High	2.3	8.0	3.4	Sm. inc.	No change	High	Rare	Good	Fair			2	47



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shagbark hickory	<i>Carya ovata</i>	WSL	Medium	4.7	6.1	1.3	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	48
paulownia	<i>Paulownia tomentosa</i>	NSL	FIA	4.3	5.8	1.1	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	49
swamp tupelo	<i>Nyssa biflora</i>	NDH	Medium	2.3	5.7	2.5	Lg. inc.	Lg. inc.	Low	Rare	Fair	Fair	Infill +	Infill +	2	50
swamp chestnut oak	<i>Quercus michauxii</i>	NSL	Low	3.5	5.3	1.5	No change	Sm. inc.	Medium	Rare	Poor	Fair			0	51
water oak	<i>Quercus nigra</i>	WDH	High	3.5	5.2	1.5	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	52
serviceberry	<i>Amelanchier spp.</i>	NSL	Low	3.5	3.6	1.0	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	53
winged elm	<i>Ulmus alata</i>	WDL	Medium	4.7	3.0	0.7	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	54
red mulberry	<i>Morus rubra</i>	NSL	Low	1.2	3.0	2.6	Sm. dec.	No change	Medium	Rare	Very Poor	Poor		Infill +	2	55
sweetbay	<i>Magnolia virginiana</i>	NSL	Medium	2.3	2.9	1.3	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	56
honeylocust	<i>Gleditsia triacanthos</i>	NSH	Low	2.3	2.7	1.2	Lg. dec.	Sm. inc.	High	Rare	Poor	Good			2	57
blackjack oak	<i>Quercus marilandica</i>	NSL	Medium	2.3	2.6	1.1	Sm. inc.	Lg. inc.	High	Rare	Good	Good			2	58
Osage-orange	<i>Maclura pomifera</i>	NDH	Medium	1.2	1.5	1.3	Very Lg. dec.	No change	High	Rare	Lost	Fair			0	59
cucumbertree	<i>Magnolia acuminata</i>	NSL	Low	1.2	1.5	1.3	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	60
sugar maple	<i>Acer saccharum</i>	WDH	High	1.2	1.4	1.2	Lg. inc.	Lg. inc.	High	Rare	Good	Good			2	61
eastern hophornbeam; ironw	<i>Ostrya virginiana</i>	WSL	Low	1.2	1.3	1.1	Lg. inc.	Lg. inc.	High	Rare	Good	Good			2	62
pond pine	<i>Pinus serotina</i>	NSH	Medium	1.2	1.2	1.0	Very Lg. dec.	Very Lg. dec.	Low	Rare	Lost	Lost			0	63
quaking aspen	<i>Populus tremuloides</i>	WDH	High	1.1	1.1	0.9	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	64
pitch pine	<i>Pinus rigida</i>	NSH	High	1.2	0.7	0.6	Very Lg. dec.	Very Lg. dec.	Medium	Rare	Lost	Lost			0	65
laurel oak	<i>Quercus laurifolia</i>	NDH	Medium	1.2	0.7	0.6	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	66
slash pine	<i>Pinus elliotii</i>	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	67
longleaf pine	<i>Pinus palustris</i>	NSH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +	3	68
bald cypress	<i>Taxodium distichum</i>	NSH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	69
striped maple	<i>Acer pensylvanicum</i>	NSL	Medium	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	70
yellow buckeye	<i>Aesculus flava</i>	NSL	Low	0	0	0	Unknown	Unknown	Low	Absent	Unknown	Unknown			0	71
yellow birch	<i>Betula alleghaniensis</i>	NDL	High	0	0	0	Unknown	Unknown	Medium	Modeled	Unknown	Unknown			0	72
cittamwood/gum bumelia	<i>Sideroxylon lanuginosum ssp.</i>	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			0	73
water hickory	<i>Carya aquatica</i>	NSL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	74
pecan	<i>Carya illinoensis</i>	NSH	Low	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat		Migrate +	3	75
shellbark hickory	<i>Carya laciniosa</i>	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	76
black hickory	<i>Carya texana</i>	NDL	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			0	77
sugarberry	<i>Celtis laevigata</i>	NDH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate ++	3	78
black ash	<i>Fraxinus nigra</i>	WSH	Medium	0	0	0	Unknown	New Habitat	Low	Absent	Unknown	New Habitat			3	79
loblolly-bay	<i>Gordonia lasianthus</i>	NSH	Medium	0	0	0	Unknown	Unknown	Medium	Modeled	Unknown	Unknown			0	80
water tupelo	<i>Nyssa aquatica</i>	NSH	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat			3	81
redbay	<i>Persea borbonia</i>	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			3	82
water elm	<i>Planera aquatica</i>	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	83
overcup oak	<i>Quercus lyrata</i>	NSL	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat		Migrate +	3	84
live oak	<i>Quercus virginiana</i>	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	85
bluejack oak	<i>Quercus incana</i>	NSL	Low	0	0	0	Unknown	New Habitat	Medium	Absent	Unknown	New Habitat			3	86
black willow	<i>Salix nigra</i>	NSH	Low	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat		Migrate +	3	87
cedar elm	<i>Ulmus crassifolia</i>	NDH	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat			0	88