

	sq. km	sq. mi	FIA Plots
Area of Region	40,984	15,824	986

**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	3			High	24	30	Increase	21	25	Very Good	10	10	Likely	2	2
Hickory	4			Medium	33	56	No Change	11	13	Good	11	17	Infill	12	16
Maple	6	Abundant	5	Low	43	18	Decrease	35	29	Fair	8	8	Migrate	11	11
Oak	11	Common	21	FIA	10		New	21	24	Poor	15	11		25	29
Pine	8	Rare	51				Unknown	22	19	Very Poor	21	19			
Other	45	Absent	33					110	110	FIA Only	4	4			
	77		110							Unknown	12	9			
											81	78			

**Potential Changes in Climate Variables**

**Temperature (°F)**

	Scenario	2009	2039	2069	2099	
Annual Average	CCSM45	49.5	51.4	53.7	54.0	
	CCSM85	49.5	51.8	54.3	57.5	
	GFDL45	49.5	52.8	55.4	56.6	
	GFDL85	49.5	53.0	56.6	60.9	
	HAD45	49.5	52.3	55.7	57.3	
HAD85	49.5	52.5	56.7	61.7		
Growing Season May—Sep	CCSM45	65.8	67.7	69.7	70.2	
	CCSM85	65.8	68.0	70.6	74.6	
	GFDL45	65.8	69.5	72.8	74.4	
	GFDL85	65.8	70.2	74.3	79.0	
	HAD45	65.8	69.0	72.1	74.2	
HAD85	65.8	68.7	73.8	79.3		
Coldest Month Average	CCSM45	24.8	26.6	28.4	28.8	
	CCSM85	24.8	27.2	28.5	30.3	
	GFDL45	24.8	28.0	29.0	29.7	
	GFDL85	24.8	28.0	29.3	31.0	
	HAD45	24.8	26.4	29.0	29.1	
HAD85	24.8	27.2	29.2	31.6		
Warmest Month Average	CCSM45	71.6	73.8	74.9	75.3	
	CCSM85	71.6	74.1	75.9	78.0	
	GFDL45	71.6	74.7	77.0	78.4	
	GFDL85	71.6	76.3	78.8	81.8	
	HAD45	71.6	75.3	77.2	78.7	
HAD85	71.6	75.5	78.8	82.6		

**Precipitation (in)**

	Scenario	2009	2039	2069	2099	
Annual Total	CCSM45	43.5	45.9	46.2	49.2	
	CCSM85	43.5	46.0	48.0	51.3	
	GFDL45	43.5	48.2	50.5	50.2	
	GFDL85	43.5	45.0	50.4	52.0	
	HAD45	43.5	45.7	46.4	46.0	
HAD85	43.5	47.7	44.6	47.8		
Growing Season May—Sep	CCSM45	20.2	22.1	22.2	23.2	
	CCSM85	20.2	21.7	22.5	23.1	
	GFDL45	20.2	21.1	21.2	21.4	
	GFDL85	20.2	19.4	21.0	21.1	
	HAD45	20.2	21.2	19.4	19.6	
HAD85	20.2	21.1	18.7	19.4		

**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-DCP30 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.

**Cite as:** Iverson, L.R.; Prasad, A.M.; Peters, M.P.; Matthews, S.N. 2019. Facilitating Adaptive Forest Management under Climate Change: A Spatially Specific Synthesis of 125 Species for Habitat Changes and Assisted Migration over the Eastern United States. *Forests*. 10(11): 989. <https://doi.org/10.3390/f10110989>.

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
red maple	Acer rubrum	WDH	High	87.7	1592.6	14.9	Sm. dec.	Lg. dec.	High	Abundant	Good	Good			1	1
chestnut oak	Quercus prinus	NDH	High	71.2	1059.7	14.0	No change	No change	High	Abundant	Very Good	Very Good			1	2
northern red oak	Quercus rubra	WDH	Medium	76.1	761.9	9.3	No change	No change	High	Abundant	Very Good	Very Good			1	3
black cherry	Prunus serotina	WDL	Medium	63.6	684.5	9.1	No change	Sm. dec.	Low	Abundant	Fair	Fair			0	4
sweet birch	Betula lenta	NDH	High	72	654.7	8.3	Lg. dec.	Lg. dec.	Low	Abundant	Poor	Poor			0	5
white oak	Quercus alba	WDH	Medium	54.3	488.1	7.5	Sm. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	6
sugar maple	Acer saccharum	WDH	High	37.3	445.8	8.5	No change	No change	High	Common	Good	Good			1	7
white ash	Fraxinus americana	WDL	Medium	53.8	371.4	6.2	No change	No change	Low	Common	Poor	Poor			0	8
yellow-poplar	Liriodendron tulipifera	WDH	High	34.7	279.7	6.5	Lg. inc.	Sm. inc.	High	Common	Very Good	Very Good			1	9
eastern hemlock	Tsuga canadensis	NSH	High	33.9	268.9	6.8	Lg. dec.	Lg. dec.	Low	Common	Very Poor	Very Poor			0	10
blackgum	Nyssa sylvatica	WDL	Medium	52.1	259.0	4.7	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good			1	11
black oak	Quercus velutina	WDH	High	49	247.6	5.0	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	12
eastern white pine	Pinus strobus	WDH	High	37.3	242.1	5.8	Sm. dec.	Sm. dec.	Low	Common	Poor	Poor			0	13
black locust	Robinia pseudoacacia	NDH	Low	32.2	222.0	6.1	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	14
sassafras	Sassafras albidum	WSL	Low	46	178.5	3.4	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	15
scarlet oak	Quercus coccinea	WDL	Medium	36.2	175.1	4.3	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	16
black walnut	Juglans nigra	WDH	Low	21.6	139.3	7.3	No change	Sm. inc.	Medium	Common	Fair	Good			1	17
pignut hickory	Carya glabra	WDL	Medium	33.9	130.3	3.6	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	18
Virginia pine	Pinus virginiana	NDH	High	13.3	129.3	10.1	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	19
American beech	Fagus grandifolia	WDH	High	21.7	109.1	3.5	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good	Infill ++	Infill ++	1	20
American basswood	Tilia americana	WSL	Medium	18	88.4	4.1	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	21
pitch pine	Pinus rigida	NSH	High	12.3	70.7	5.3	Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor			0	22
bigtooth aspen	Populus grandidentata	NSL	Medium	15	66.6	3.5	Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor			0	23
shagbark hickory	Carya ovata	WSL	Medium	23.3	65.1	2.8	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	24
mockernut hickory	Carya alba	WDL	Medium	17	60.9	3.4	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	25
ailanthus	Ailanthus altissima	NSL	FIA	10.5	54.8	5.5	Unknown	Unknown	NA	Common	NNIS	NNIS			0	26
serviceberry	Amelanchier spp.	NSL	Low	25.8	45.6	1.5	Lg. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	27
American elm	Ulmus americana	WDH	Medium	12.5	45.5	4.3	Sm. inc.	Lg. inc.	Medium	Rare	Fair	Good	Infill +	Infill ++	1	28
yellow birch	Betula alleghaniensis	NDL	High	9.4	43.6	2.9	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	29
bitternut hickory	Carya cordiformis	WSL	Low	9.9	43.2	3.7	No change	No change	High	Rare	Fair	Fair	Infill +	Infill +	1	30
eastern hophornbeam; ironw	Ostrya virginiana	WSL	Low	18.1	40.2	2.0	Sm. inc.	Lg. inc.	High	Rare	Good	Good			1	31
quaking aspen	Populus tremuloides	WDH	High	3.3	39.4	5.7	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	32
hackberry	Celtis occidentalis	WDH	Medium	4.4	39.4	6.9	Sm. dec.	No change	High	Rare	Poor	Fair	Infill +	Infill +	2	33
Scots pine	Pinus sylvestris	NSH	FIA	5.7	35.5	6.9	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	34
Norway spruce	Picea abies	NSH	FIA	2	34.8	8.8	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	35
striped maple	Acer pensylvanicum	NSL	Medium	16.6	34.7	1.9	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	36
cucumbertree	Magnolia acuminata	NSL	Low	11.7	34.4	2.4	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	37
sycamore	Platanus occidentalis	NSL	Low	2.4	23.5	5.9	Sm. inc.	Lg. inc.	Medium	Rare	Fair	Good	Infill +	Infill ++	2	38
slippery elm	Ulmus rubra	WSL	Low	9.5	22.2	2.4	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	1	39
silver maple	Acer saccharinum	NSH	Low	0.9	22.0	14.5	Sm. dec.	No change	High	Rare	Poor	Fair	Infill +	Infill +	2	40
bear oak; scrub oak	Quercus ilicifolia	NSLX	FIA	3.5	20.2	3.9	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	41
red pine	Pinus resinosa	NSH	Medium	4.1	19.2	5.9	Very Lg. dec.	Very Lg. dec.	Low	Rare	Lost	Lost			0	42
gray birch	Betula populifolia	NSL	Low	4.6	18.4	3.3	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	43
boxelder	Acer negundo	WSH	Low	4.7	14.3	3.2	No change	No change	High	Rare	Fair	Fair	Infill +	Infill +	2	44
Norway maple	Acer platanoides	NSL	FIA	5.3	13.5	4.6	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	45
American hornbeam; musclev	Carpinus caroliniana	WSL	Low	4.9	13.2	1.9	Sm. dec.	No change	Medium	Rare	Very Poor	Poor		Infill +	1	46
pin cherry	Prunus pensylvanica	NSL	Low	5.6	13.0	1.8	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	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
paper birch	Betula papyrifera	WDH	High	1.8	11.6	4.2	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	48
eastern redcedar	Juniperus virginiana	WDH	Medium	3.3	10.3	2.9	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	2	49
loblolly pine	Pinus taeda	WDH	High	0.1	9.4	10.1	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	50
pin oak	Quercus palustris	NSH	Low	3.2	9.0	4.9	No change	No change	Low	Rare	Very Poor	Very Poor			2	51
flowering dogwood	Cornus florida	WDL	Medium	7.4	7.1	0.7	Sm. inc.	Lg. inc.	Medium	Rare	Fair	Good	Infill +	Infill ++	1	52
eastern redbud	Cercis canadensis	NSL	Low	2.6	5.7	2.0	Sm. inc.	Lg. inc.	Medium	Rare	Fair	Good	Infill +	Infill ++	2	53
swamp white oak	Quercus bicolor	NSL	Low	1.2	5.5	4.5	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	54
tamarack (native)	Larix laricina	NSH	High	1.5	5.1	3.7	Lg. dec.	Lg. dec.	Low	Rare	Very Poor	Very Poor			0	55
eastern cottonwood	Populus deltoides	NSH	Low	0.4	5.0	8.0	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			2	56
green ash	Fraxinus pennsylvanica	WSH	Low	2.6	4.6	1.9	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	57
white spruce	Picea glauca	NSL	Medium	0.7	4.4	5.9	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	58
honeylocust	Gleditsia triacanthos	NSH	Low	0.7	4.3	5.5	Sm. dec.	No change	High	Rare	Poor	Fair		Infill +	2	59
black willow	Salix nigra	NSH	Low	0.5	4.3	8.7	Sm. dec.	No change	Low	Rare	Very Poor	Very Poor			2	60
Table Mountain pine	Pinus pungens	NSL	Low	1.5	3.8	2.6	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor		Infill +	2	61
butternut	Juglans cinerea	NSLX	FIA	0.9	2.5	2.6	Unknown	Unknown	Low	Rare	FIA Only	FIA Only			0	62
chokecherry	Prunus virginiana	NSLX	FIA	1	2.5	1.4	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	63
Osage-orange	Maclura pomifera	NDH	Medium	0.5	1.9	3.7	Sm. dec.	Sm. inc.	High	Rare	Poor	Good			2	64
pawpaw	Asimina triloba	NSL	Low	0.5	1.8	0.8	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	65
white mulberry	Morus alba	NSL	FIA	0.6	1.7	1.5	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	66
river birch	Betula nigra	NSL	Low	0.5	1.2	2.4	Sm. dec.	Sm. inc.	Medium	Rare	Very Poor	Fair		Infill +	2	67
bur oak	Quercus macrocarpa	NDH	Medium	0.2	1.2	4.7	Lg. dec.	Lg. dec.	High	Rare	Poor	Poor			0	68
American chestnut	Castanea dentata	NSLX	FIA	2.8	1.0	0.4	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	69
swamp chestnut oak	Quercus michauxii	NSL	Low	0.1	0.8	0.7	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	70
red spruce	Picea rubens	NDH	High	0.5	0.7	0.6	Very Lg. dec.	Lg. dec.	Low	Rare	Lost	Very Poor			0	71
jack pine	Pinus banksiana	NSH	Medium	0.2	0.5	1.7	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor			0	72
paulownia	Paulownia tomentosa	NSL	FIA	1.2	0.4	1.5	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	73
balsam poplar	Populus balsamifera	NSH	Medium	0.2	0.3	1.3	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	74
red mulberry	Morus rubra	NSL	Low	1	0.2	3.7	No change	Sm. inc.	Medium	Rare	Poor	Fair	Infill +	Infill +	2	75
black ash	Fraxinus nigra	WSH	Medium	0.2	0.2	0.9	Lg. dec.	Very Lg. dec.	Low	Rare	Very Poor	Lost			0	76
northern pin oak	Quercus ellipsoidalis	NSH	Medium	1	0.1	2.0	Lg. dec.	Lg. dec.	High	Rare	Poor	Poor			0	77
Atlantic white-cedar	Chamaecyparis thyoides	NSH	Low	0	0	0	Unknown	Unknown	Low	Absent	Unknown	Unknown			0	78
shortleaf pine	Pinus echinata	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate ++	3	79
northern white-cedar	Thuja occidentalis	WSH	High	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	80
florida maple	Acer barbatum	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	81
black maple	Acer nigrum	NSH	Low	0	0	0	Unknown	Unknown	High	Absent	Unknown	Unknown			0	82
mountain maple	Acer spicatum	NSL	Low	0	0	0	Unknown	Unknown	High	Absent	Unknown	Unknown			0	83
cittamwood/gum bumelia	Sideroxylon lanuginosum ssp.	NSL	Low	0	0	0	Unknown	New Habitat	High	Absent	Unknown	New Habitat			0	84
pecan	Carya illinoensis	NSH	Low	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat			3	85
shellbark hickory	Carya laciniosa	NSL	Low	0	0	0	Unknown	New Habitat	Medium	Absent	Unknown	New Habitat			3	86
black hickory	Carya texana	NDL	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			0	87
sugarberry	Celtis laevigata	NDH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	88
common persimmon	Diospyros virginiana	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate ++	Migrate ++	3	89
blue ash	Fraxinus quadrangulata	NSL	Low	0	0	0	Unknown	Unknown	Low	Absent	Unknown	Unknown			0	90
silverbell	Halesia spp.	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	91
American holly	Ilex opaca	NSL	Medium	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	92
sweetgum	Liquidambar styraciflua	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate ++	Migrate ++	3	93
southern magnolia	Magnolia grandiflora	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	94

# MidAtlantic 4

## NIACS EVAS Region 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

Common Name	Scientific Name	Range	MR	%Cell	FIAsum	FIAiv	ChngCl45	ChngCl85	Adap	Abund	Capabil45	Capabil85	SHIFT45	SHIFT85	SSO	N
bigleaf magnolia	Magnolia macrophylla	NSL	Low	0	0	0	New Habitat	Unknown	Medium	Absent	New Habitat	Unknown			3	95
mountain or Fraser magnolia	Magnolia fraseri	NSL	Low	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat			0	96
sourwood	Oxydendrum arboreum	NDL	High	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate ++	Migrate ++	3	97
redbay	Persea borbonia	NSL	Low	0	0	0	Unknown	New Habitat	High	Absent	Unknown	New Habitat			3	98
southern red oak	Quercus falcata	WDL	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Likely +	Likely +	3	99
cherrybark oak; swamp red o.	Quercus pagoda	NSL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	100
overcup oak	Quercus lyrata	NSL	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat			3	101
blackjack oak	Quercus marilandica	NSL	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +	Migrate ++	3	102
chinkapin oak	Quercus muehlenbergii	NSL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Likely +	Likely +	3	103
water oak	Quercus nigra	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate ++	3	104
willow oak	Quercus phellos	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	105
Shumard oak	Quercus shumardii	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			3	106
post oak	Quercus stellata	WDH	High	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate ++	Migrate ++	3	107
bluejack oak	Quercus incana	NSL	Low	0	0	0	Unknown	New Habitat	Medium	Absent	Unknown	New Habitat			0	108
winged elm	Ulmus alata	WDL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate ++	3	109
cedar elm	Ulmus crassifolia	NDH	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat			0	110