

	sq. km	sq. mi	FIA Plots
Area of Region	66,580	25,707	2,098

**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	26	27	Increase	21	25	Very Good	5	7	Likely	0	0
Hickory	5			Medium	31	54	No Change	15	10	Good	17	20	Infill	15	15
Maple	7	Abundant	7	Low	36	17	Decrease	31	32	Fair	10	6	Migrate	5	13
Oak	12	Common	19	FIA	10		New	18	21	Poor	16	15		20	28
Pine	7	Rare	51				Unknown	18	15	Very Poor	18	15			
Other	43	Absent	25							FIA Only	5	5			
	<b>77</b>		<b>102</b>		<b>103</b>	<b>98</b>		<b>103</b>	<b>103</b>	Unknown	8	5			
											<b>79</b>	<b>73</b>			

**Potential Changes in Climate Variables**

**Temperature (°F)**

Scenario	2009	2039	2069	2099		
Annual	CCSM45	45.6	47.5	49.9	50.1	
Average	CCSM85	45.6	47.9	50.5	53.8	
	GFDL45	45.6	48.4	51.7	52.9	
	GFDL85	45.6	49.1	53.0	57.5	
	HAD45	45.6	48.6	52.0	53.7	
	HAD85	45.6	48.7	53.0	58.3	
Growing Season	CCSM45	62.2	64.2	66.2	66.7	
	CCSM85	62.2	64.5	67.0	71.0	
May—Sep	GFDL45	62.2	65.3	69.4	71.0	
	GFDL85	62.2	66.5	70.9	75.8	
	HAD45	62.2	65.5	68.4	70.8	
	HAD85	62.2	65.1	70.0	76.0	
Coldest Month	CCSM45	19.9	21.9	23.9	24.2	
	CCSM85	19.9	22.8	24.0	26.1	
Average	GFDL45	19.9	23.0	24.5	25.2	
	GFDL85	19.9	23.5	25.0	27.2	
	HAD45	19.9	21.7	24.7	24.9	
	HAD85	19.9	22.9	25.3	28.4	
Warmest Month	CCSM45	68.0	70.4	71.6	71.8	
	CCSM85	68.0	70.7	72.4	74.6	
Average	GFDL45	68.0	70.9	73.3	74.5	
	GFDL85	68.0	72.4	75.0	78.0	
	HAD45	68.0	71.7	73.4	75.1	
	HAD85	68.0	71.8	74.9	79.2	

**Precipitation (in)**

Scenario	2009	2039	2069	2099		
Annual	CCSM45	42.9	43.5	43.0	46.3	
Total	CCSM85	42.9	44.0	45.5	47.0	
	GFDL45	42.9	47.4	49.2	48.4	
	GFDL85	42.9	44.8	48.5	50.3	
	HAD45	42.9	44.2	45.2	44.6	
	HAD85	42.9	45.6	44.0	47.5	
Growing Season	CCSM45	20.5	21.1	20.5	21.9	
Season	CCSM85	20.5	20.6	21.4	20.8	
May—Sep	GFDL45	20.5	21.4	21.0	21.1	
	GFDL85	20.5	20.3	20.7	20.5	
	HAD45	20.5	21.0	19.4	19.8	
	HAD85	20.5	20.6	18.9	20.0	

**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	90.8	2072.0	18.5	Sm. dec.	Sm. dec.	High	Abundant	Good	Good			1	1
sugar maple	Acer saccharum	WDH	High	77.8	1377.9	15.3	Sm. dec.	Sm. dec.	High	Abundant	Good	Good			1	2
white ash	Fraxinus americana	WDL	Medium	71.4	789.4	9.1	No change	No change	Low	Abundant	Fair	Fair			0	3
eastern hemlock	Tsuga canadensis	NSH	High	58.5	733.7	10.3	Sm. dec.	Lg. dec.	Low	Abundant	Fair	Poor			0	4
black cherry	Prunus serotina	WDL	Medium	66.5	711.3	8.9	No change	No change	Low	Abundant	Fair	Fair			0	5
American beech	Fagus grandifolia	WDH	High	65.8	662.9	8.8	Sm. dec.	Sm. dec.	Medium	Abundant	Fair	Fair			0	6
northern red oak	Quercus rubra	WDH	Medium	53.4	507.8	7.5	Sm. inc.	Sm. inc.	High	Abundant	Very Good	Very Good			1	7
eastern white pine	Pinus strobus	WDH	High	42.5	454.5	9.1	No change	Sm. dec.	Low	Common	Poor	Poor			0	8
sweet birch	Betula lenta	NDH	High	57	395.5	5.7	No change	Sm. dec.	Low	Common	Poor	Poor			0	9
chestnut oak	Quercus prinus	NDH	High	20.7	283.2	8.6	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	10
white oak	Quercus alba	WDH	Medium	26.3	271.4	7.4	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	11
quaking aspen	Populus tremuloides	WDH	High	29.3	228.3	6.6	Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor			0	12
yellow birch	Betula alleghaniensis	NDL	High	43.8	215.1	4.4	Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor			0	13
eastern hophornbeam; ironw	Ostrya virginiana	WSL	Low	44.8	137.7	2.7	No change	No change	High	Common	Good	Good			1	14
American basswood	Tilia americana	WSL	Medium	28.7	123.0	3.4	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	15
red pine	Pinus resinosa	NSH	Medium	8.8	100.3	10.5	Lg. dec.	Very Lg. dec.	Low	Common	Very Poor	Lost			0	16
American elm	Ulmus americana	WDH	Medium	18.8	90.7	3.6	Sm. inc.	Lg. inc.	Medium	Common	Good	Very Good			1	17
black oak	Quercus velutina	WDH	High	16	88.4	3.6	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	18
Norway spruce	Picea abies	NSH	FIA	9	87.0	8.6	Unknown	Unknown	NA	Common	NNIS	NNIS			0	19
bigtooth aspen	Populus grandidentata	NSL	Medium	17.9	80.9	3.5	Sm. inc.	Sm. dec.	Medium	Common	Good	Poor			1	20
Scots pine	Pinus sylvestris	NSH	FIA	6.9	73.0	9.3	Unknown	Unknown	NA	Common	NNIS	NNIS			0	21
serviceberry	Amelanchier spp.	NSL	Low	34.4	70.7	1.8	Sm. dec.	Sm. dec.	Medium	Common	Poor	Poor			0	22
scarlet oak	Quercus coccinea	WDL	Medium	9.4	66.3	4.7	No change	Sm. inc.	Medium	Common	Fair	Good	Infill +	Infill ++	1	23
pin cherry	Prunus pensylvanica	NSL	Low	10.7	55.9	4.1	Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor			0	24
black locust	Robinia pseudoacacia	NDH	Low	5.3	54.3	6.9	Sm. inc.	Lg. inc.	Medium	Common	Good	Very Good			1	25
shagbark hickory	Carya ovata	WSL	Medium	12.8	54.0	3.1	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	26
pignut hickory	Carya glabra	WDL	Medium	13.7	50.0	2.6	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			1	27
American hornbeam; muscle	Carpinus caroliniana	WSL	Low	24	47.6	1.8	Sm. dec.	Sm. inc.	Medium	Rare	Very Poor	Fair			1	28
bitternut hickory	Carya cordiformis	WSL	Low	10.4	46.9	3.5	No change	Lg. inc.	High	Rare	Fair	Good			1	29
white spruce	Picea glauca	NSL	Medium	3	42.3	14.1	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	30
striped maple	Acer pensylvanicum	NSL	Medium	21.3	41.5	1.8	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	31
paper birch	Betula papyrifera	WDH	High	10	38.8	3.6	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	32
green ash	Fraxinus pennsylvanica	WSH	Low	2.7	37.8	8.6	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	1	33
black willow	Salix nigra	NSH	Low	2.6	34.3	12.6	Sm. dec.	Sm. dec.	Low	Rare	Very Poor	Very Poor			0	34
sassafras	Sassafras albidum	WSL	Low	8	32.7	2.3	Sm. inc.	Lg. inc.	Medium	Rare	Fair	Good	Infill +	Infill ++	1	35
blackgum	Nyssa sylvatica	WDL	Medium	9.5	30.2	1.8	Sm. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	Infill ++	1	36
eastern cottonwood	Populus deltoides	NSH	Low	1.9	28.2	9.3	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	37
red spruce	Picea rubens	NDH	High	4.2	25.7	5.8	Lg. dec.	Lg. dec.	Low	Rare	Very Poor	Very Poor			0	38
yellow-poplar	Liriodendron tulipifera	WDH	High	6.8	21.0	2.4	Lg. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	Infill ++	1	39
pitch pine	Pinus rigida	NSH	High	4.2	18.5	3.2	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	1	40
silver maple	Acer saccharinum	NSH	Low	0.9	17.7	16.0	Sm. dec.	No change	High	Rare	Poor	Fair	Infill +	Infill +	2	41
eastern redcedar	Juniperus virginiana	WDH	Medium	1.8	17.6	2.0	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	2	42
cucumber tree	Magnolia acuminata	NSL	Low	6.5	13.8	1.6	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	43
black walnut	Juglans nigra	WDH	Low	2.3	13.8	3.5	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	1	44
balsam fir	Abies balsamea	NDH	High	1.4	13.2	8.0	Lg. dec.	Lg. dec.	Low	Rare	Very Poor	Very Poor			0	45
sycamore	Platanus occidentalis	NSL	Low	1.4	12.9	8.4	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	2	46
gray birch	Betula populifolia	NSL	Low	4.5	12.3	1.9	Sm. 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
bear oak; scrub oak	Quercus ilicifolia	NSLX	FIA	0.7	11.1	3.0	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	48
boxelder	Acer negundo	WSH	Low	1	10.3	5.0	No change	No change	High	Rare	Fair	Fair	Infill +	Infill +	2	49
butternut	Juglans cinerea	NSLX	FIA	2	9.8	3.5	Unknown	Unknown	Low	Rare	FIA Only	FIA Only			0	50
mockernut hickory	Carya alba	WDL	Medium	3	8.3	1.4	Lg. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	Infill ++	2	51
northern white-cedar	Thuja occidentalis	WSH	High	0.6	7.4	7.6	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	52
black ash	Fraxinus nigra	WSH	Medium	1	6.5	5.4	Very Lg. dec.	Very Lg. dec.	Low	Rare	Lost	Lost			0	53
chokecherry	Prunus virginiana	NSLX	FIA	1.9	6.0	2.1	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	54
swamp white oak	Quercus bicolor	NSL	Low	0.2	5.6	3.8	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			2	55
black spruce	Picea mariana	NSH	High	0.2	4.9	32.3	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	56
pin oak	Quercus palustris	NSH	Low	0.1	4.8	1.2	No change	No change	Low	Rare	Very Poor	Very Poor			2	57
tamarack (native)	Larix laricina	NSH	High	0.7	4.7	5.3	Lg. dec.	Very Lg. dec.	Low	Rare	Very Poor	Lost			0	58
Virginia pine	Pinus virginiana	NDH	High	0.4	3.1	3.6	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	59
slippery elm	Ulmus rubra	WSL	Low	1.2	2.5	1.0	Sm. inc.	Lg. inc.	Medium	Rare	Fair	Good	Infill +		2	60
ailanthus	Ailanthus altissima	NSL	FIA	0.1	2.3	0.9	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	61
jack pine	Pinus banksiana	NSH	Medium	0.2	2.3	5.4	Lg. dec.	Very Lg. dec.	High	Rare	Poor	Lost			0	62
bur oak	Quercus macrocarpa	NDH	Medium	0.2	1.9	5.6	Lg. dec.	Lg. dec.	High	Rare	Poor	Poor			0	63
river birch	Betula nigra	NSL	Low	0.1	1.6	5.1	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	64
flowering dogwood	Cornus florida	WDL	Medium	1.3	1.6	0.9	No change	Lg. inc.	Medium	Rare	Poor	Good		Infill ++	2	65
American chestnut	Castanea dentata	NSLX	FIA	1.4	1.3	0.6	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	66
shingle oak	Quercus imbricaria	NDH	Medium	0.2	1.3	2.5	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	67
American mountain-ash	Sorbus americana	NSL	Low	0.6	1.2	2.0	Sm. dec.	Sm. dec.	Low	Rare	Very Poor	Very Poor			0	68
northern pin oak	Quercus ellipsoidalis	NSH	Medium	0	0.8	0.3	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor			0	69
shellbark hickory	Carya laciniosa	NSL	Low	0.1	0.5	2.3	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	70
mountain maple	Acer spicatum	NSL	Low	0.5	0.4	0.8	Sm. dec.	Lg. dec.	High	Rare	Poor	Poor			0	71
hackberry	Celtis occidentalis	WDH	Medium	0	0.3	0.5	Lg. inc.	Lg. inc.	High	Rare	Good	Good			2	72
Norway maple	Acer platanoides	NSL	FIA	0.1	0.3	0.5	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	73
chinkapin oak	Quercus muehlenbergii	NSL	Medium	0	0.2	0.2	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	74
white mulberry	Morus alba	NSL	FIA	0	0.2	0.2	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	75
Table Mountain pine	Pinus pungens	NSL	Low	0.1	0.2	0.5	No change	Sm. inc.	High	Rare	Fair	Good			2	76
northern catalpa	Catalpa speciosa	NSHX	FIA	0	0.1	0.2	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	77
shortleaf pine	Pinus echinata	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate ++	3	78
loblolly pine	Pinus taeda	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate ++	3	79
florida maple	Acer barbatum	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			3	80
black maple	Acer nigrum	NSH	Low	0	0	0	Unknown	Unknown	High	Absent	Unknown	Unknown			0	81
pawpaw	Asimina triloba	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	82
cittamwood/gum bumelia	Sideroxylon lanuginosum ssp.	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			0	83
pecan	Carya illinoensis	NSH	Low	0	0	0	Unknown	New Habitat	Low	Absent	Unknown	New Habitat			3	84
black hickory	Carya texana	NDL	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			0	85
sugarberry	Celtis laevigata	NDH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			2	86
eastern redbud	Cercis canadensis	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	87
common persimmon	Diospyros virginiana	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat		Migrate +	3	88
American holly	Ilex opaca	NSL	Medium	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	89
sweetgum	Liquidambar styraciflua	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate ++	3	90
southern magnolia	Magnolia grandiflora	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	91
bigleaf magnolia	Magnolia macrophylla	NSL	Low	0	0	0	New Habitat	Unknown	Medium	Absent	New Habitat	Unknown			3	92
mountain or Fraser magnolia	Magnolia fraseri	NSL	Low	0	0	0	Unknown	New Habitat	Low	Absent	Unknown	New Habitat			0	93
sourwood	Oxydendrum arboreum	NDL	High	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	94

# MidAtlantic 3

## 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
southern red oak	Quercus falcata	WDL	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat		Migrate +	3	95
cherrybark oak; swamp red o	Quercus pagoda	NSL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +	3	96
overcup oak	Quercus lyrata	NSL	Medium	0	0	0	Unknown	New Habitat	Low	Absent	Unknown	New Habitat			3	97
blackjack oak	Quercus marilandica	NSL	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat		Migrate ++	3	98
swamp chestnut oak	Quercus michauxii	NSL	Low	0	0	0	Unknown	Unknown	Medium	Modeled	Unknown	Unknown			0	99
water oak	Quercus nigra	WDH	High	0	0	0	Unknown	New Habitat	Medium	Absent	Unknown	New Habitat		Migrate +	3	100
Shumard oak	Quercus shumardii	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			3	101
post oak	Quercus stellata	WDH	High	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +	Migrate ++	3	102
winged elm	Ulmus alata	WDL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +	3	103