

U.S. Census Bureau Urban Areas
Climate Change Atlas Tree Species
 Current and Potential Future Habitat, Capability, and Migration

	sq. km	sq. mi	FIA Plots
Area of Region	8,100.0	3,127.4	268

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	20	24	Increase	24	32	Very Good	10	11	Likely	1	2
Hickory	4			Medium	26	48	No Change	7	8	Good	15	19	Infill	12	19
Maple	4	Abundant	6	Low	36	11	Decrease	28	19	Fair	7	10	Migrate	2	9
Oak	9	Common	25	FIA	3		New	10	14	Poor	14	12			
Pine	6	Rare	31				Unknown	16	12	Very Poor	12	5			
Other	37	Absent	21							FIA Only	1	1			
	62		83		85	83		85	85	Unknown	13	9			
											72	67			

Potential Changes in Climate Variables

Temperature (°F)

	Scenario	2009	2039	2069	2099	
Annual Average	CCSM45	55.6	57.4	59.6	59.8	
	CCSM85	55.6	57.8	60.3	63.3	
	GFDL45	55.6	58.2	61.0	61.9	
	GFDL85	55.6	58.7	62.1	66.0	
	HAD45	55.6	58.0	61.3	62.5	
HAD85	55.6	58.3	62.3	66.7		
Growing Season (May—Sep)	CCSM45	70.3	72.2	74.2	74.8	
	CCSM85	70.3	72.5	75.2	79.0	
	GFDL45	70.3	73.3	76.5	77.9	
	GFDL85	70.3	74.1	78.0	82.3	
	HAD45	70.3	73.2	76.4	77.9	
HAD85	70.3	73.3	78.4	83.2		
Coldest Month (Average)	CCSM45	33.8	35.7	36.8	37.2	
	CCSM85	33.8	36.2	37.3	38.5	
	GFDL45	33.8	37.2	37.6	38.2	
	GFDL85	33.8	36.1	37.0	38.3	
	HAD45	33.8	34.9	36.8	37.0	
HAD85	33.8	35.2	36.7	38.3		
Warmest Month (Average)	CCSM45	75.9	78.1	79.1	79.3	
	CCSM85	75.9	78.2	80.1	81.7	
	GFDL45	75.9	79.1	80.7	81.8	
	GFDL85	75.9	80.2	82.4	84.9	
	HAD45	75.9	79.2	81.3	82.2	
HAD85	75.9	79.9	83.1	86.3		

Precipitation (in)

	Scenario	2009	2039	2069	2099	
Annual Total	CCSM45	44.9	49.2	51.5	51.6	
	CCSM85	44.9	50.4	51.9	57.6	
	GFDL45	44.9	50.2	52.8	54.8	
	GFDL85	44.9	47.5	53.1	54.4	
	HAD45	44.9	48.2	49.0	48.1	
HAD85	44.9	50.3	48.4	50.8		
Growing Season (May—Sep)	CCSM45	20.3	24.4	25.3	25.3	
	CCSM85	20.3	24.1	24.3	26.9	
	GFDL45	20.3	22.5	23.7	24.7	
	GFDL85	20.3	20.8	23.9	24.3	
	HAD45	20.3	23.1	21.9	21.1	
HAD85	20.3	23.5	22.2	22.8		

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
yellow-poplar	Liriodendron tulipifera	WDH	High	88.9	1320.4	14.5	Lg. dec.	Lg. dec.	High	Abundant	Good	Good			1	1
chestnut oak	Quercus prinus	NDH	High	65.4	1007.3	15.0	Sm. dec.	Sm. dec.	High	Abundant	Good	Good			1	2
Virginia pine	Pinus virginiana	NDH	High	81.5	1006.5	12.1	Lg. dec.	Lg. dec.	Medium	Abundant	Fair	Fair			0	3
red maple	Acer rubrum	WDH	High	95.1	995.1	10.2	Sm. dec.	Sm. dec.	High	Abundant	Good	Good			1	4
loblolly pine	Pinus taeda	WDH	High	44.4	859.8	18.9	Sm. inc.	Lg. inc.	Medium	Abundant	Very Good	Very Good			1	5
white oak	Quercus alba	WDH	Medium	84	624.4	7.3	Sm. inc.	Sm. inc.	High	Abundant	Very Good	Very Good			1	6
sourwood	Oxydendrum arboreum	NDL	High	63	283.4	4.4	Sm. dec.	Lg. dec.	High	Common	Fair	Fair			1	7
northern red oak	Quercus rubra	WDH	Medium	67.9	280.0	4.0	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good			1	8
scarlet oak	Quercus coccinea	WDL	Medium	53.1	269.5	5.0	Sm. dec.	Sm. dec.	Medium	Common	Poor	Poor			0	9
mockernut hickory	Carya alba	WDL	Medium	65.4	223.7	3.3	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good			1	10
blackgum	Nyssa sylvatica	WDL	Medium	74.1	215.2	2.8	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good			1	11
pignut hickory	Carya glabra	WDL	Medium	63	190.4	3.0	Sm. inc.	No change	Medium	Common	Good	Fair			1	12
black cherry	Prunus serotina	WDL	Medium	54.3	170.8	3.1	Sm. inc.	Sm. inc.	Low	Common	Fair	Fair			1	13
black locust	Robinia pseudoacacia	NDH	Low	51.9	160.9	3.0	Lg. dec.	Sm. dec.	Medium	Common	Poor	Poor			0	14
green ash	Fraxinus pennsylvanica	WSH	Low	34.6	159.5	4.5	No change	Sm. inc.	Medium	Common	Fair	Good			1	15
eastern redcedar	Juniperus virginiana	WDH	Medium	45.7	157.3	3.4	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	16
black oak	Quercus velutina	WDH	High	69.1	156.4	2.2	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	17
eastern white pine	Pinus strobus	WDH	High	23.5	151.5	6.3	Sm. dec.	Sm. dec.	Low	Common	Poor	Poor	Infill +	Infill +	0	18
southern red oak	Quercus falcata	WDL	Medium	45.7	148.9	3.2	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	19
white ash	Fraxinus americana	WDL	Medium	30.9	134.3	4.2	No change	Sm. inc.	Low	Common	Poor	Fair			1	20
ailanthus	Ailanthus altissima	NSL	FIA	35.8	128.4	3.5	Unknown	Unknown	NA	Common	NNIS	NNIS			0	21
American beech	Fagus grandifolia	WDH	High	33.3	102.2	3.0	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	22
sweet birch	Betula lenta	NDH	High	22.2	98.5	4.3	Sm. dec.	Sm. dec.	Low	Common	Poor	Poor	Infill +	Infill +	0	23
black walnut	Juglans nigra	WDH	Low	24.7	93.9	3.7	Sm. dec.	No change	Medium	Common	Poor	Fair			1	24
flowering dogwood	Cornus florida	WDL	Medium	54.3	85.7	1.5	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	25
sassafras	Sassafras albidum	WSL	Low	29.6	81.2	2.7	Lg. dec.	Sm. dec.	Medium	Common	Poor	Poor			0	26
shortleaf pine	Pinus echinata	WDH	High	29.6	77.5	2.6	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	27
sweetgum	Liquidambar styraciflua	WDH	High	11.1	73.7	6.5	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good	Infill ++	Infill ++	1	28
shagbark hickory	Carya ovata	WSL	Medium	13.6	66.0	4.7	Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor			0	29
eastern redbud	Cercis canadensis	NSL	Low	28.4	64.6	2.2	Sm. dec.	No change	Medium	Common	Poor	Fair			1	30
American hornbeam; muscley	Carpinus caroliniana	WSL	Low	34.6	59.2	1.7	Sm. inc.	Lg. inc.	Medium	Common	Good	Very Good			1	31
pitch pine	Pinus rigida	NSH	High	16	44.5	2.7	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	32
common persimmon	Diospyros virginiana	NSL	Low	22.2	43.9	1.9	Lg. dec.	Sm. inc.	High	Rare	Poor	Good			1	33
sycamore	Platanus occidentalis	NSL	Low	18.5	43.4	2.3	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			1	34
eastern hemlock	Tsuga canadensis	NSH	High	13.6	40.7	2.9	No change	Sm. inc.	Low	Rare	Very Poor	Poor		Infill +	2	35
cucumbertree	Magnolia acuminata	NSL	Low	19.8	37.3	1.8	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	36
paulownia	Paulownia tomentosa	NSL	FIA	7.4	32.5	4.3	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	37
post oak	Quercus stellata	WDH	High	21	30.4	1.4	Lg. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	Infill ++	1	38
American basswood	Tilia americana	WSL	Medium	11.1	27.5	2.4	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	39
bitternut hickory	Carya cordiformis	WSL	Low	12.3	26.9	2.1	Sm. inc.	Sm. inc.	High	Rare	Good	Good	Infill ++	Infill ++	1	40
American elm	Ulmus americana	WDH	Medium	24.7	25.7	1.0	Sm. inc.	Lg. inc.	Medium	Rare	Fair	Good			1	41
willow oak	Quercus phellos	NSL	Low	6.2	25.7	4.1	Sm. dec.	No change	Medium	Rare	Very Poor	Poor		Infill +	1	42
Table Mountain pine	Pinus pungens	NSL	Low	8.6	22.7	2.6	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor		Infill +	2	43
pin cherry	Prunus pensylvanica	NSL	Low	4.9	16.8	3.3	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	44
boxelder	Acer negundo	WSH	Low	7.4	15.4	2.0	Sm. dec.	No change	High	Rare	Poor	Fair	Infill +	Infill +	2	45
sugar maple	Acer saccharum	WDH	High	9.9	14.5	1.4	Sm. inc.	Sm. inc.	High	Rare	Good	Good	Infill ++	Infill ++	2	46
striped maple	Acer pensylvanicum	NSL	Medium	7.4	14.4	1.9	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	47

U.S. Census Bureau Urban Areas
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
slippery elm	Ulmus rubra	WSL	Low	9.9	9.7	1.0	Sm. dec.	No change	Medium	Rare	Very Poor	Poor		Infill +	1	48
eastern hophornbeam; ironw	Ostrya virginiana	WSL	Low	6.2	9.3	1.5	Sm. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	Infill ++	1	49
serviceberry	Amelanchier spp.	NSL	Low	11.1	6.0	0.5	Sm. dec.	No change	Medium	Rare	Very Poor	Poor			1	50
black willow	Salix nigra	NSH	Low	2.5	4.8	1.9	Lg. dec.	Lg. inc.	Low	Rare	Very Poor	Fair		Infill +	2	51
hackberry	Celtis occidentalis	WDH	Medium	4.9	4.5	0.9	No change	Sm. inc.	High	Rare	Fair	Good	Infill +	Infill ++	2	52
pawpaw	Asimina triloba	NSL	Low	6.2	4.4	0.7	Lg. dec.	Very Lg. dec.	Medium	Rare	Very Poor	Lost			0	53
winged elm	Ulmus alata	WDL	Medium	3.7	3.9	1.0	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	2	54
red mulberry	Morus rubra	NSL	Low	4.9	3.8	0.7	Sm. dec.	Sm. inc.	Medium	Rare	Very Poor	Fair		Infill +	2	55
yellow birch	Betula alleghaniensis	NDL	High	2.5	3.3	1.3	No change	No change	Medium	Rare	Poor	Poor		Infill +	2	56
American chestnut	Castanea dentata	NSLX	FIA	4.9	2.3	0.5	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	57
honeylocust	Gleditsia triacanthos	NSH	Low	2.5	1.7	0.7	No change	Lg. inc.	High	Rare	Fair	Good			2	58
Osage-orange	Maclura pomifera	NDH	Medium	1.2	1.5	1.2	Very Lg. dec.	Very Lg. dec.	High	Rare	Lost	Lost			0	59
American holly	Ilex opaca	NSL	Medium	2.5	1.3	0.5	No change	Lg. inc.	Medium	Rare	Poor	Good	Infill +	Infill ++	2	60
blackjack oak	Quercus marilandica	NSL	Medium	1.2	0.8	0.7	Lg. inc.	Lg. inc.	High	Rare	Good	Good			2	61
river birch	Betula nigra	NSL	Low	1.2	0.6	0.5	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	1	62
longleaf pine	Pinus palustris	NSH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +	3	63
northern white-cedar	Thuja occidentalis	WSH	High	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	64
florida maple	Acer barbatum	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Likely +	Likely +	3	65
black maple	Acer nigrum	NSH	Low	0	0	0	Unknown	Unknown	High	Absent	Unknown	Unknown			0	66
mountain maple	Acer spicatum	NSL	Low	0	0	0	Unknown	Unknown	High	Absent	Unknown	Unknown			0	67
yellow buckeye	Aesculus flava	NSL	Low	0	0	0	Unknown	Unknown	Low	Absent	Unknown	Unknown			0	68
pecan	Carya illinoensis	NSH	Low	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat		Migrate +	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		Migrate +	3	72
black ash	Fraxinus nigra	WSH	Medium	0	0	0	Unknown	New Habitat	Low	Absent	Unknown	New Habitat			3	73
silverbell	Halesia spp.	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	74
southern magnolia	Magnolia grandiflora	NSL	Low	0	0	0	Unknown	New Habitat	Medium	Absent	Unknown	New Habitat		Likely +	3	75
bigleaf magnolia	Magnolia macrophylla	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	76
mountain or Fraser magnolia	Magnolia fraseri	NSL	Low	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat			0	77
swamp white oak	Quercus bicolor	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		Migrate +	3	79
laurel oak	Quercus laurifolia	NDH	Medium	0	0	0	Unknown	New Habitat	Medium	Absent	Unknown	New Habitat		Migrate +	3	80
chinkapin oak	Quercus muehlenbergii	NSL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	81
water oak	Quercus nigra	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate ++	3	82
Shumard oak	Quercus shumardii	NSL	Low	0	0	0	Unknown	New Habitat	High	Absent	Unknown	New Habitat		Migrate +	3	83
bluejack oak	Quercus incana	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +	3	84
American mountain-ash	Sorbus americana	NSL	Low	0	0	0	Unknown	Unknown	Low	Absent	Unknown	Unknown			0	85