

**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	8,000.0	3,088.8	34

**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						
		Abundant	Common		Reliability	Adaptability	Scenario RCP45	Scenario RCP85	Scenario RCP45	Scenario RCP85	SHIFT RCP45	SHIFT RCP85			
Ash	2			High	5	13	Increase	7	6	Very Good	0	0	Likely	2	2
Hickory	2			Medium	17	22	No Change	9	11	Good	6	5	Infill	17	19
Maple	2	Abundant	0	Low	17	6	Decrease	10	9	Fair	3	4	Migrate	1	5
Oak	3	Common	3	FIA	3		New	8	10	Poor	11	11		<b>20</b>	<b>26</b>
Pine	1	Rare	26				Unknown	8	6	Very Poor	6	6			
Other	19	Absent	12					<b>42</b>	<b>42</b>	FIA Only	2	2			
	<b>29</b>		<b>41</b>		<b>42</b>	<b>41</b>				Unknown	5	3			
											<b>33</b>	<b>31</b>			

**Potential Changes in Climate Variables**

**Temperature (°F)**

	Scenario	2009	2039	2069	2099
Annual Average	CCSM45	50.7	52.6	54.8	55.5
	CCSM85	50.7	53.2	55.7	58.7
	GFDL45	50.7	56.9	55.5	56.9
	GFDL85	50.7	53.5	56.7	61.1
	HAD45	50.7	53.3	56.4	57.8
	HAD85	50.7	53.9	58.5	62.3
Growing Season May—Sep	CCSM45	69.7	71.9	74.1	75.0
	CCSM85	69.7	72.7	75.3	78.7
	GFDL45	69.7	77.8	75.7	77.8
	GFDL85	69.7	73.4	77.0	82.5
	HAD45	69.7	71.8	74.2	75.7
	HAD85	69.7	72.6	77.3	80.7
Coldest Month Average	CCSM45	20.7	23.1	24.5	25.3
	CCSM85	20.7	23.4	24.6	26.6
	GFDL45	20.7	24.1	24.7	25.1
	GFDL85	20.7	23.3	24.8	26.4
	HAD45	20.7	22.9	26.2	26.0
	HAD85	20.7	25.9	29.3	31.7
Warmest Month Average	CCSM45	76.0	78.3	80.0	80.7
	CCSM85	76.0	80.0	81.7	83.8
	GFDL45	76.0	79.5	80.9	82.4
	GFDL85	76.0	80.3	81.7	85.6
	HAD45	76.0	77.8	79.6	80.3
	HAD85	76.0	79.5	82.3	84.4

**Precipitation (in)**

	Scenario	2009	2039	2069	2099
Annual Total	CCSM45	31.6	32.1	32.0	30.9
	CCSM85	31.6	31.7	32.0	33.0
	GFDL45	31.6	35.8	38.0	37.0
	GFDL85	31.6	35.5	38.8	37.4
	HAD45	31.6	36.1	36.1	35.9
	HAD85	31.6	34.0	33.1	36.6
Growing Season May—Sep	CCSM45	19.9	19.6	19.0	18.6
	CCSM85	19.9	18.7	18.4	19.0
	GFDL45	19.9	22.8	23.5	22.2
	GFDL85	19.9	22.5	23.8	22.0
	HAD45	19.9	21.5	21.6	21.5
	HAD85	19.9	20.5	18.9	18.9

**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 mulberry	Morus rubra	NSL	Low	75	76.2	14.6	Sm. dec.	Sm. dec.	Medium	Common	Poor	Poor	Infill +	Infill +	2	1
bur oak	Quercus macrocarpa	NDH	Medium	45	75.6	24.2	Sm. dec.	Sm. dec.	High	Common	Fair	Fair	Infill +	Infill +	2	2
hackberry	Celtis occidentalis	WDH	Medium	65	65.3	14.5	No change	No change	High	Common	Good	Good	Infill ++	Infill ++	2	3
boxelder	Acer negundo	WSH	Low	45	49.0	15.7	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor	Infill +	Infill +	2	4
green ash	Fraxinus pennsylvanica	WSH	Low	45	47.9	15.3	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	5
eastern cottonwood	Populus deltoides	NSH	Low	30	44.5	21.4	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	6
black willow	Salix nigra	NSH	Low	20	36.1	26.0	Lg. dec.	Sm. dec.	Low	Rare	Very Poor	Very Poor			2	7
American elm	Ulmus americana	WDH	Medium	55	30.7	8.0	Sm. inc.	Sm. inc.	Medium	Rare	Fair	Fair	Infill +	Infill +	2	8
Siberian elm	Ulmus pumila	NDH	FIA	10	22.6	32.6	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	9
black walnut	Juglans nigra	WDH	Low	35	20.4	8.4	Lg. inc.	Sm. inc.	Medium	Rare	Good	Fair	Infill ++	Infill +	2	10
eastern hophornbeam; ironw	Ostrya virginiana	WSL	Low	30	20.1	9.7	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor	Infill +	Infill +	2	11
slippery elm	Ulmus rubra	WSL	Low	50	20.0	5.8	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	12
eastern redcedar	Juniperus virginiana	WDH	Medium	25	18.9	10.9	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	2	13
northern red oak	Quercus rubra	WDH	Medium	25	15.9	9.1	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor	Infill +	Infill +	2	14
American basswood	Tilia americana	WSL	Medium	20	15.5	11.1	Sm. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			2	15
honeylocust	Gleditsia triacanthos	NSH	Low	20	13.2	9.5	Lg. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	Infill ++	2	16
sycamore	Platanus occidentalis	NSL	Low	10	12.0	17.3	Sm. dec.	No change	Medium	Rare	Very Poor	Poor		Infill +	2	17
bitternut hickory	Carya cordiformis	WSL	Low	30	9.9	4.7	Sm. inc.	Sm. inc.	High	Rare	Good	Good	Infill ++	Infill ++	2	18
black locust	Robinia pseudoacacia	NDH	Low	5	7.2	20.8	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	19
white ash	Fraxinus americana	WDL	Medium	10	5.8	8.3	No change	No change	Low	Rare	Very Poor	Very Poor			2	20
silver maple	Acer saccharinum	NSH	Low	5	4.8	13.9	No change	No change	High	Rare	Fair	Fair	Infill +	Infill +	2	21
eastern redbud	Cercis canadensis	NSL	Low	10	4.5	6.5	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	22
shagbark hickory	Carya ovata	WSL	Medium	10	2.3	3.3	No change	No change	Medium	Rare	Poor	Poor		Infill +	2	23
red pine	Pinus resinosa	NSH	Medium	5	1.3	3.7	Sm. dec.	Sm. dec.	Low	Rare	Very Poor	Very Poor			0	24
overcup oak	Quercus lyrata	NSL	Medium	5	1.1	3.3	Sm. dec.	Sm. dec.	Low	Rare	Very Poor	Very Poor			0	25
Osage-orange	Maclura pomifera	NDH	Medium	5	1.1	3.1	Lg. inc.	Lg. inc.	High	Rare	Good	Good			2	26
black cherry	Prunus serotina	WDL	Medium	10	1.0	1.5	Sm. inc.	No change	Low	Rare	Poor	Very Poor			2	27
Kentucky coffeetree	Gymnocladus dioicus	NSLX	FIA	5	0.8	2.3	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	28
peachleaf willow	Salix amygdaloides	NSLX	FIA	5	0.5	1.6	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	29
sugar maple	Acer saccharum	WDH	High	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat		Migrate +	3	30
yellow birch	Betula alleghaniensis	NDL	High	0	0	0	Unknown	Unknown	Medium	Modeled	Unknown	Unknown			0	31
pignut hickory	Carya glabra	WDL	Medium	0	0	0	Unknown	New Habitat	Medium	Absent	Unknown	New Habitat			3	32
pecan	Carya illinoensis	NSH	Low	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat		Migrate ++	3	33
black hickory	Carya texana	NDL	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	34
sugarberry	Celtis laevigata	NDH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	35
flowering dogwood	Cornus florida	WDL	Medium	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	36
bigleaf magnolia	Magnolia macrophylla	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	37
blackjack oak	Quercus marilandica	NSL	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat		Migrate +	3	38
chinkapin oak	Quercus muehlenbergii	NSL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Likely +	Likely +	3	39
Shumard oak	Quercus shumardii	NSL	Low	0	0	0	Unknown	New Habitat	High	Absent	Unknown	New Habitat		Migrate +	3	40
post oak	Quercus stellata	WDH	High	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +	Migrate ++	3	41
black oak	Quercus velutina	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Likely +	Likely +	3	42