

**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    8,202.9    3,167.2      183

**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	22	19	Increase	17	20	Very Good	4	6	Likely	0	0
Hickory	4			Medium	28	45	No Change	14	8	Good	13	13	Infill	0	0
Maple	4	Abundant	5	Low	27	15	Decrease	16	19	Fair	11	10	Migrate	0	0
Oak	8	Common	18	FIA	6		New	25	26	Poor	9	7		0	0
Pine	2	Rare	30				Unknown	11	10	Very Poor	8	9			
Other	32	Absent	29							FIA Only	2	2			
	<b>53</b>		<b>82</b>		<b>83</b>	<b>79</b>		<b>83</b>	<b>83</b>	Unknown	5	4			
											<b>52</b>	<b>51</b>			

**Potential Changes in Climate Variables**

**Temperature (°F)**

Scenario	2009	2039	2069	2099	
Annual	49.7	51.5	53.6	53.9	
Average	49.7	52.0	54.4	57.5	
GFDL45	49.7	52.9	55.4	56.5	
GFDL85	49.7	52.9	56.6	60.8	
HAD45	49.7	52.2	55.6	57.2	
HAD85	49.7	52.1	56.4	61.2	
Growing Season	66.1	68.2	69.9	70.4	
May—Sep	66.1	68.4	70.9	74.5	
GFDL45	66.1	69.6	72.6	73.8	
GFDL85	66.1	69.8	73.9	78.2	
HAD45	66.1	68.9	71.9	73.9	
HAD85	66.1	68.1	72.8	77.9	
Coldest Month	24.5	26.2	27.9	28.4	
Average	24.5	27.1	28.3	30.3	
GFDL45	24.5	28.0	29.4	30.3	
GFDL85	24.5	28.0	29.6	31.8	
HAD45	24.5	26.1	28.7	29.0	
HAD85	24.5	27.1	29.3	32.1	
Warmest Month	72.3	74.7	75.7	75.8	
Average	72.3	75.0	76.5	78.4	
GFDL45	72.3	75.2	77.0	78.1	
GFDL85	72.3	76.2	78.7	81.3	
HAD45	72.3	75.3	76.7	77.8	
HAD85	72.3	74.6	77.0	80.4	

**Precipitation (in)**

Scenario	2009	2039	2069	2099	
Annual	49.4	50.2	49.9	55.1	
Total	49.4	51.0	54.0	57.0	
GFDL45	49.4	54.7	58.6	56.3	
GFDL85	49.4	53.1	56.6	60.3	
HAD45	49.4	50.5	53.2	53.1	
HAD85	49.4	53.8	53.4	56.1	
Growing Season	21.6	24.6	23.4	25.5	
May—Sep	21.6	23.1	25.1	24.7	
GFDL45	21.6	22.5	22.6	23.7	
GFDL85	21.6	22.2	22.7	23.7	
HAD45	21.6	22.2	21.3	21.6	
HAD85	21.6	22.4	21.6	22.3	

**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	91.5	1888.0	22.4	Sm. dec.	Lg. dec.	High	Abundant	Good	Good			0	1
sweet birch	Betula lenta	NDH	High	74.1	900.5	12.7	Sm. dec.	Lg. dec.	Low	Abundant	Fair	Poor			0	2
northern red oak	Quercus rubra	WDH	Medium	73.1	887.8	13.3	Sm. dec.	Sm. dec.	High	Abundant	Good	Good			0	3
sugar maple	Acer saccharum	WDH	High	69.9	788.4	12.5	No change	No change	High	Abundant	Very Good	Very Good			0	4
white ash	Fraxinus americana	WDL	Medium	65.1	626.3	10.6	No change	Sm. dec.	Low	Abundant	Fair	Fair			0	5
black oak	Quercus velutina	WDH	High	52.5	387.1	8.6	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			0	6
chestnut oak	Quercus prinus	NDH	High	31.1	288.2	9.7	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good			0	7
black cherry	Prunus serotina	WDL	Medium	48	265.1	6.1	Sm. inc.	Sm. inc.	Low	Common	Fair	Fair			0	8
eastern hemlock	Tsuga canadensis	NSH	High	27.9	251.0	8.7	No change	Sm. dec.	Low	Common	Poor	Poor			0	9
American beech	Fagus grandifolia	WDH	High	45.9	238.6	5.4	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			0	10
American elm	Ulmus americana	WDH	Medium	39.5	233.2	6.8	No change	No change	Medium	Common	Fair	Fair			0	11
yellow birch	Betula alleghaniensis	NDL	High	37.3	231.9	6.5	No change	No change	Medium	Common	Fair	Fair			0	12
eastern white pine	Pinus strobus	WDH	High	19.7	197.3	11.3	No change	Sm. dec.	Low	Common	Poor	Poor			0	13
white oak	Quercus alba	WDH	Medium	41.1	152.8	4.2	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			0	14
black locust	Robinia pseudoacacia	NDH	Low	14.9	149.6	12.1	Sm. inc.	Lg. inc.	Medium	Common	Good	Very Good			0	15
scarlet oak	Quercus coccinea	WDL	Medium	21.8	147.2	6.5	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			0	16
pignut hickory	Carya glabra	WDL	Medium	41.7	141.6	3.6	Sm. inc.	Lg. inc.	Medium	Common	Good	Very Good			0	17
shagbark hickory	Carya ovata	WSL	Medium	35.1	138.2	4.5	No change	No change	Medium	Common	Fair	Fair			0	18
yellow-poplar	Liriodendron tulipifera	WDH	High	24.1	85.3	4.4	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			0	19
green ash	Fraxinus pennsylvanica	WSH	Low	8.5	80.4	9.2	No change	No change	Medium	Common	Fair	Fair			0	20
American basswood	Tilia americana	WSL	Medium	7.2	73.4	9.8	No change	No change	Medium	Common	Fair	Fair			0	21
swamp white oak	Quercus bicolor	NSL	Low	14.6	69.7	7.6	Sm. dec.	Lg. dec.	Medium	Common	Poor	Poor			0	22
paper birch	Betula papyrifera	WDH	High	11	50.7	4.5	Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor			0	23
Norway maple	Acer platanoides	NSL	FIA	15.1	48.8	5.0	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	24
eastern redcedar	Juniperus virginiana	WDH	Medium	17.4	47.0	3.5	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			0	25
Scots pine	Pinus sylvestris	NSH	FIA	2.4	45.0	18.0	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	26
black ash	Fraxinus nigra	WSH	Medium	3.7	40.1	10.7	Lg. dec.	Lg. dec.	Low	Rare	Very Poor	Very Poor			0	27
sassafras	Sassafras albidum	WSL	Low	10.4	37.9	4.4	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			0	28
blackgum	Nyssa sylvatica	WDL	Medium	8.1	32.8	5.4	No change	Sm. inc.	High	Rare	Fair	Good			0	29
bigtooth aspen	Populus grandidentata	NSL	Medium	8.5	32.4	3.7	No change	Sm. dec.	Medium	Rare	Poor	Very Poor			0	30
quaking aspen	Populus tremuloides	WDH	High	4.9	29.4	5.9	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	31
bitternut hickory	Carya cordiformis	WSL	Low	12.1	29.3	2.3	Sm. inc.	Lg. inc.	High	Rare	Good	Good			0	32
serviceberry	Amelanchier spp.	NSL	Low	16.9	29.1	1.7	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	33
sycamore	Platanus occidentalis	NSL	Low	1.2	28.8	23.1	No change	Sm. inc.	Medium	Rare	Poor	Fair			0	34
American hornbeam; muscley	Carpinus caroliniana	WSL	Low	14.6	26.6	1.8	No change	Lg. inc.	Medium	Rare	Poor	Good			0	35
mockernut hickory	Carya alba	WDL	Medium	6.1	21.0	3.4	Sm. inc.	Lg. inc.	High	Rare	Good	Good			0	36
eastern hophornbeam; ironw	Ostrya virginiana	WSL	Low	13.4	19.9	1.5	Lg. inc.	Lg. inc.	High	Rare	Good	Good			0	37
butternut	Juglans cinerea	NSLX	FIA	2.4	18.0	7.2	Unknown	Unknown	Low	Rare	FIA Only	FIA Only			0	38
ailanthus	Ailanthus altissima	NSL	FIA	12.8	16.9	2.9	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	39
flowering dogwood	Cornus florida	WDL	Medium	8.9	7.6	1.3	No change	No change	Medium	Rare	Poor	Poor			0	40
Norway spruce	Picea abies	NSH	FIA	3.7	7.2	1.9	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	41
striped maple	Acer pensylvanicum	NSL	Medium	4.9	6.8	1.4	Sm. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	42
gray birch	Betula populifolia	NSL	Low	6.5	5.2	1.5	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	43
pin cherry	Prunus pensylvanica	NSL	Low	2.4	5.2	2.1	Very Lg. dec.	Very Lg. dec.	Medium	Rare	Lost	Lost			0	44
red spruce	Picea rubens	NDH	High	4.4	2.7	1.3	Sm. dec.	Sm. dec.	Low	Rare	Very Poor	Very Poor			0	45
black willow	Salix nigra	NSH	Low	1.2	2.3	1.9	Lg. dec.	No change	Low	Rare	Very Poor	Very Poor			0	46
American chestnut	Castanea dentata	NSLX	FIA	4.4	2.3	1.0	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			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
slippery elm	Ulmus rubra	WSL	Low	2.4	2.0	0.8	Very Lg. dec.	Very Lg. dec.	Medium	Rare	Lost	Lost				0 48
eastern cottonwood	Populus deltoides	NSH	Low	1.2	1.2	1.0	Sm. inc.	Sm. inc.	Medium	Rare	Fair	Fair				0 49
northern pin oak	Quercus ellipsoidalis	NSH	Medium	4	1.2	3.1	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor				0 50
black walnut	Juglans nigra	WDH	Low	1.1	0.9	0.6	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good				0 51
pin oak	Quercus palustris	NSH	Low	4	0.4	1.1	Lg. inc.	Lg. inc.	Low	Rare	Fair	Fair				0 52
tamarack (native)	Larix laricina	NSH	High	3.2	0.3	0.7	Sm. dec.	Sm. dec.	Low	Rare	Very Poor	Very Poor				0 53
white spruce	Picea glauca	NSL	Medium	0	0	0	Unknown	Unknown	Medium	Modeled	Unknown	Unknown				0 54
shortleaf pine	Pinus echinata	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat				0 55
loblolly pine	Pinus taeda	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat				0 56
Virginia pine	Pinus virginiana	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat				0 57
bald cypress	Taxodium distichum	NSH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat				0 58
florida maple	Acer barbatum	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat				0 59
boxelder	Acer negundo	WSH	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat				0 60
silver maple	Acer saccharinum	NSH	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat				0 61
pecan	Carya illinoensis	NSH	Low	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat				0 62
black hickory	Carya texana	NDL	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat				0 63
sugarberry	Celtis laevigata	NDH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat				0 64
eastern redbud	Cercis canadensis	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat				0 65
common persimmon	Diospyros virginiana	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat				0 66
sweetgum	Liquidambar styraciflua	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat				0 67
sweetbay	Magnolia virginiana	NSL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat				0 68
bigleaf magnolia	Magnolia macrophylla	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown				0 69
mountain or Fraser magnolia	Magnolia fraseri	NSL	Low	0	0	0	Unknown	Unknown	Low	Absent	Unknown	Unknown				0 70
swamp tupelo	Nyssa biflora	NDH	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat				0 71
sourwood	Oxydendrum arboreum	NDL	High	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat				0 72
southern red oak	Quercus falcata	WDL	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat				0 73
cherrybark oak; swamp red o.	Quercus pagoda	NSL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat				0 74
laurel oak	Quercus laurifolia	NDH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat				0 75
blackjack oak	Quercus marilandica	NSL	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat				0 76
swamp chestnut oak	Quercus michauxii	NSL	Low	0	0	0	Unknown	New Habitat	Medium	Absent	Unknown	New Habitat				0 77
chinkapin oak	Quercus muehlenbergii	NSL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat				0 78
water oak	Quercus nigra	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat				0 79
willow oak	Quercus phellos	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat				0 80
post oak	Quercus stellata	WDH	High	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat				0 81
American mountain-ash	Sorbus americana	NSL	Low	0	0	0	Unknown	Unknown	Low	Absent	Unknown	Unknown				0 82
winged elm	Ulmus alata	WDL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat				0 83