

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

Area of Region sq. km sq. mi FIA Plots
8,600.0 3,320.5 245

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	21	19	Increase	20	22	Very Good	9	10	Likely	1	1
Hickory	4			Medium	24	42	No Change	10	7	Good	11	12	Infill	5	8
Maple	5	Abundant	7	Low	23	11	Decrease	17	18	Fair	9	8	Migrate	2	13
Oak	6	Common	23	FIA	7		New	16	18	Poor	11	10		8	22
Pine	5	Rare	24				Unknown	12	10	Very Poor	5	4			
Other	32	Absent	20							FIA Only	4	4			
	54		74		75	72		75	75	Unknown	5	3			
											54	51			

Potential Changes in Climate Variables

Temperature (°F)

Scenario	2009	2039	2069	2099		
Annual	CCSM45	46.9	48.8	51.1	51.4	
Average	CCSM85	46.9	49.2	51.8	55.0	
	GFDL45	46.9	49.7	52.9	54.1	
	GFDL85	46.9	50.4	54.2	58.5	
	HAD45	46.9	49.9	53.3	54.9	
	HAD85	46.9	50.0	54.3	59.4	
Growing Season	CCSM45	63.6	65.6	67.5	68.1	
	CCSM85	63.6	65.9	68.4	72.4	
May—Sep	GFDL45	63.6	66.6	70.6	72.0	
	GFDL85	63.6	67.8	72.0	76.7	
	HAD45	63.6	66.9	69.8	72.1	
	HAD85	63.6	66.4	71.3	77.1	
Coldest Month	CCSM45	21.4	23.3	25.1	25.5	
	CCSM85	21.4	23.9	25.1	27.1	
Average	GFDL45	21.4	24.6	25.9	26.6	
	GFDL85	21.4	24.7	26.3	28.3	
	HAD45	21.4	23.3	26.0	26.2	
	HAD85	21.4	24.4	26.5	29.3	
Warmest Month	CCSM45	69.4	71.8	73.0	73.2	
	CCSM85	69.4	72.2	73.9	76.0	
Average	GFDL45	69.4	72.4	74.6	75.9	
	GFDL85	69.4	73.8	76.3	79.3	
	HAD45	69.4	73.0	74.8	76.3	
	HAD85	69.4	73.0	76.0	80.1	

Precipitation (in)

Scenario	2009	2039	2069	2099		
Annual	CCSM45	45.5	46.8	47.1	50.9	
Total	CCSM85	45.5	47.2	49.7	51.9	
	GFDL45	45.5	50.3	53.0	52.2	
	GFDL85	45.5	47.6	52.0	54.6	
	HAD45	45.5	47.4	48.3	47.6	
	HAD85	45.5	49.4	47.6	50.7	
Growing Season	CCSM45	21.4	23.1	23.1	24.6	
	CCSM85	21.4	22.6	23.9	23.8	
May—Sep	GFDL45	21.4	22.1	22.3	23.0	
	GFDL85	21.4	21.1	22.1	22.6	
	HAD45	21.4	22.4	20.3	20.5	
	HAD85	21.4	21.8	20.4	21.4	

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	94.2	2464.3	25.3	Sm. dec.	Lg. dec.	High	Abundant	Good	Good			1	1
sugar maple	Acer saccharum	WDH	High	55.8	779.0	13.5	No change	No change	High	Abundant	Very Good	Very Good			1	2
eastern hemlock	Tsuga canadensis	NSH	High	57	744.1	12.6	Lg. dec.	Lg. dec.	Low	Abundant	Poor	Poor			0	3
chestnut oak	Quercus prinus	NDH	High	40.7	632.9	15.0	Sm. inc.	Sm. inc.	High	Abundant	Very Good	Very Good			1	4
American beech	Fagus grandifolia	WDH	High	48.8	549.6	10.9	Sm. dec.	Sm. dec.	Medium	Abundant	Fair	Fair			0	5
white ash	Fraxinus americana	WDL	Medium	55.8	515.8	8.9	Sm. inc.	No change	Low	Abundant	Good	Fair			1	6
sweet birch	Betula lenta	NDH	High	64	505.8	7.6	No change	Sm. dec.	Low	Abundant	Fair	Fair			0	7
black cherry	Prunus serotina	WDL	Medium	60.5	461.3	7.4	Sm. inc.	Sm. inc.	Low	Common	Fair	Fair			1	8
white oak	Quercus alba	WDH	Medium	37.2	445.1	11.5	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good			1	9
northern red oak	Quercus rubra	WDH	Medium	52.3	419.8	7.7	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good			1	10
eastern white pine	Pinus strobus	WDH	High	30.2	246.7	7.9	Sm. inc.	No change	Low	Common	Fair	Poor			1	11
yellow birch	Betula alleghaniensis	NDL	High	38.4	170.6	4.3	Sm. dec.	Sm. dec.	Medium	Common	Poor	Poor			0	12
scarlet oak	Quercus coccinea	WDL	Medium	22.1	156.6	6.8	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	13
sassafras	Sassafras albidum	WSL	Low	25.6	142.4	5.4	Lg. inc.	Sm. inc.	Medium	Common	Very Good	Good			1	14
bigtooth aspen	Populus grandidentata	NSL	Medium	24.4	141.1	5.6	Sm. dec.	Lg. dec.	Medium	Common	Poor	Poor			0	15
quaking aspen	Populus tremuloides	WDH	High	20.9	140.1	6.5	Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor			0	16
blackgum	Nyssa sylvatica	WDL	Medium	27.9	126.2	4.4	Sm. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	17
black locust	Robinia pseudoacacia	NDH	Low	8.1	116.9	13.9	No change	No change	Medium	Common	Fair	Fair			1	18
eastern hophornbeam; ironw	Ostrya virginiana	WSL	Low	29.1	93.9	3.1	No change	Sm. inc.	High	Common	Good	Very Good			1	19
red pine	Pinus resinosa	NSH	Medium	3.5	88.2	24.4	Very Lg. dec.	Very Lg. dec.	Low	Common	Lost	Lost			0	20
bear oak; scrub oak	Quercus ilicifolia	NSLX	FIA	5.8	79.0	13.1	Unknown	Unknown	Medium	Common	FIA Only	FIA Only			0	21
black oak	Quercus velutina	WDH	High	18.6	76.9	4.0	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	22
American basswood	Tilia americana	WSL	Medium	25.6	72.8	2.7	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	23
gray birch	Betula populifolia	NSL	Low	22.1	65.3	2.9	Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor			0	24
Scots pine	Pinus sylvestris	NSH	FIA	3.5	58.5	16.2	Unknown	Unknown	NA	Common	NNIS	NNIS			0	25
paper birch	Betula papyrifera	WDH	High	8.1	55.7	6.6	Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor			0	26
eastern cottonwood	Populus deltoides	NSH	Low	3.5	55.1	15.2	Sm. dec.	Sm. dec.	Medium	Common	Poor	Poor	Infill +	Infill +	0	27
serviceberry	Amelanchier spp.	NSL	Low	24.4	54.5	2.2	No change	Sm. dec.	Medium	Common	Fair	Poor			1	28
red spruce	Picea rubens	NDH	High	8.1	51.3	6.1	Lg. dec.	Lg. dec.	Low	Common	Very Poor	Very Poor			0	29
bitternut hickory	Carya cordiformis	WSL	Low	12.8	50.5	3.8	No change	Lg. inc.	High	Common	Good	Very Good	Infill ++	Infill ++	1	30
black ash	Fraxinus nigra	WSH	Medium	1.2	40.2	33.3	Very Lg. dec.	Very Lg. dec.	Low	Rare	Lost	Lost			0	31
shagbark hickory	Carya ovata	WSL	Medium	11.6	39.5	3.3	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			1	32
pignut hickory	Carya glabra	WDL	Medium	12.8	37.9	2.9	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			1	33
ailanthus	Ailanthus altissima	NSL	FIA	2.3	33.2	13.8	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	34
yellow-poplar	Liriodendron tulipifera	WDH	High	8.1	30.3	3.6	Lg. inc.	Lg. inc.	High	Rare	Good	Good			1	35
Norway spruce	Picea abies	NSH	FIA	3.5	23.0	6.4	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	36
chokecherry	Prunus virginiana	NSLX	FIA	1.2	21.6	17.9	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	37
American hornbeam; musclev	Carpinus caroliniana	WSL	Low	11.6	19.8	1.6	No change	Lg. inc.	Medium	Rare	Poor	Good			1	38
pin cherry	Prunus pensylvanica	NSL	Low	4.7	19.7	4.1	Lg. dec.	Very Lg. dec.	Medium	Rare	Very Poor	Lost			0	39
black walnut	Juglans nigra	WDH	Low	5.8	17.6	2.9	Sm. inc.	Lg. inc.	Medium	Rare	Fair	Good			1	40
striped maple	Acer pensylvanicum	NSL	Medium	14	17.0	1.2	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	41
American elm	Ulmus americana	WDH	Medium	9.3	15.0	1.6	No change	Sm. inc.	Medium	Rare	Poor	Fair	Infill +	Infill +	1	42
silver maple	Acer saccharinum	NSH	Low	1.2	14.7	12.2	Sm. dec.	No change	High	Rare	Poor	Fair		Infill +	2	43
mockernut hickory	Carya alba	WDL	Medium	4.7	11.1	2.3	Lg. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	Infill ++	1	44
eastern redcedar	Juniperus virginiana	WDH	Medium	2.3	8.7	3.6	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	45
pitch pine	Pinus rigida	NSH	High	4.7	7.3	1.5	No change	Sm. dec.	Medium	Rare	Poor	Very Poor			1	46
butternut	Juglans cinerea	NSLX	FIA	2.3	5.5	2.3	Unknown	Unknown	Low	Rare	FIA Only	FIA Only			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
Virginia pine	Pinus virginiana	NDH	High	2.3	5.5	2.3	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	2	48
boxelder	Acer negundo	WSH	Low	1.2	5.4	4.5	No change	No change	High	Rare	Fair	Fair		Infill +	2	49
river birch	Betula nigra	NSL	Low	1.2	3.7	3.1	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	50
cucumbertree	Magnolia acuminata	NSL	Low	1.2	3.4	2.8	Sm. dec.	No change	Medium	Rare	Very Poor	Poor		Infill +	2	51
American chestnut	Castanea dentata	NSLX	FIA	2.3	2.1	0.9	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	52
sycamore	Platanus occidentalis	NSL	Low	1.2	1.9	1.6	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	53
slippery elm	Ulmus rubra	WSL	Low	2.3	1.3	0.5	Sm. inc.	Lg. inc.	Medium	Rare	Fair	Good			2	54
shortleaf pine	Pinus echinata	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate ++	3	55
loblolly pine	Pinus taeda	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate ++	3	56
florida maple	Acer barbatum	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			3	57
black hickory	Carya texana	NDL	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			0	58
sugarberry	Celtis laevigata	NDH	Medium	0	0	0	Unknown	New Habitat	Medium	Absent	Unknown	New Habitat			0	59
hackberry	Celtis occidentalis	WDH	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat		Migrate +	3	60
eastern redbud	Cercis canadensis	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	61
flowering dogwood	Cornus florida	WDL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Likely +	Likely +	3	62
common persimmon	Diospyros virginiana	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat		Migrate +	3	63
green ash	Fraxinus pennsylvanica	WSH	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate ++	3	64
American holly	Ilex opaca	NSL	Medium	0	0	0	Unknown	Unknown	Medium	Modeled	Unknown	Unknown			0	65
sweetgum	Liquidambar styraciflua	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate ++	3	66
bigleaf magnolia	Magnolia macrophylla	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	67
mountain or Fraser magnolia	Magnolia fraseri	NSL	Low	0	0	0	Unknown	New Habitat	Low	Absent	Unknown	New Habitat			0	68
sourwood	Oxydendrum arboreum	NDL	High	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	69
southern red oak	Quercus falcata	WDL	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat		Migrate +	3	70
blackjack oak	Quercus marilandica	NSL	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat		Migrate ++	3	71
chinkapin oak	Quercus muehlenbergii	NSL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +	3	72
post oak	Quercus stellata	WDH	High	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat		Migrate ++	3	73
American mountain-ash	Sorbus americana	NSL	Low	0	0	0	Unknown	Unknown	Low	Absent	Unknown	Unknown			0	74
winged elm	Ulmus alata	WDL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +	3	75