

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	8,200.0	3,166.0	77

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	21	Increase	16	17	Very Good	2	2	Likely	5	5
Hickory	4			Medium	28	46	No Change	14	9	Good	11	13	Infill	14	12
Maple	5	Abundant	0	Low	27	10	Decrease	19	23	Fair	11	10	Migrate	9	12
Oak	9	Common	14	FIA	7		New	22	22	Poor	9	6		28	29
Pine	3	Rare	42				Unknown	11	11	Very Poor	14	16			
Other	33	Absent	25					82	82	FIA Only	2	2			
	56		81		82	77				Unknown	4	4			
											53	53			

Potential Changes in Climate Variables

Temperature (°F)

	Scenario	2009	2039	2069	2099	
Annual Average	CCSM45	52.8	54.5	56.7	57.0	
	CCSM85	52.8	54.9	57.4	60.5	
	GFDL45	52.8	58.7	58.4	59.6	
	GFDL85	52.8	56.1	59.6	63.8	
	HAD45	52.8	55.5	58.9	60.4	
HAD85	52.8	55.6	59.8	64.5		
Growing Season (May—Sep)	CCSM45	68.9	70.7	72.6	73.1	
	CCSM85	68.9	71.0	73.6	77.4	
	GFDL45	68.9	76.0	75.6	77.1	
	GFDL85	68.9	73.1	77.1	81.6	
	HAD45	68.9	72.0	75.1	77.1	
HAD85	68.9	71.7	76.6	81.9		
Coldest Month (Average)	CCSM45	28.4	30.4	32.0	32.4	
	CCSM85	28.4	30.7	32.0	33.8	
	GFDL45	28.4	31.7	32.5	33.1	
	GFDL85	28.4	31.6	32.8	34.4	
	HAD45	28.4	30.2	32.6	32.8	
HAD85	28.4	30.8	32.7	34.9		
Warmest Month (Average)	CCSM45	74.8	77.0	77.9	78.2	
	CCSM85	74.8	77.1	79.0	80.7	
	GFDL45	74.8	77.8	79.8	81.2	
	GFDL85	74.8	79.3	81.6	84.5	
	HAD45	74.8	78.3	80.2	81.5	
HAD85	74.8	78.4	81.5	85.1		

Precipitation (in)

	Scenario	2009	2039	2069	2099	
Annual Total	CCSM45	43.2	45.9	47.4	50.2	
	CCSM85	43.2	46.3	48.2	52.8	
	GFDL45	43.2	48.3	51.5	51.3	
	GFDL85	43.2	44.9	51.1	52.5	
	HAD45	43.2	45.5	46.9	46.2	
HAD85	43.2	48.7	44.9	48.4		
Growing Season (May—Sep)	CCSM45	19.7	22.3	23.2	24.5	
	CCSM85	19.7	22.1	22.8	24.6	
	GFDL45	19.7	20.6	21.9	22.3	
	GFDL85	19.7	19.1	21.3	21.7	
	HAD45	19.7	20.6	19.3	18.8	
HAD85	19.7	21.2	18.5	19.2		

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	63.4	235.7	11.7	Sm. dec.	Sm. dec.	High	Common	Fair	Fair			1	1
chestnut oak	Quercus prinus	NDH	High	59.8	212.1	14.5	Sm. dec.	Sm. dec.	High	Common	Fair	Fair			1	2
yellow-poplar	Liriodendron tulipifera	WDH	High	67.1	188.7	16.1	No change	Sm. dec.	High	Common	Good	Fair			1	3
black cherry	Prunus serotina	WDL	Medium	69.5	187.0	10.8	Sm. dec.	Sm. dec.	Low	Common	Poor	Poor			0	4
northern red oak	Quercus rubra	WDH	Medium	61	136.7	8.5	No change	No change	High	Common	Good	Good			1	5
blackgum	Nyssa sylvatica	WDL	Medium	54.9	131.9	8.6	Sm. dec.	Sm. dec.	High	Common	Fair	Fair			1	6
white oak	Quercus alba	WDH	Medium	58.5	113.1	8.2	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good			1	7
black oak	Quercus velutina	WDH	High	61	101.5	7.4	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	8
pignut hickory	Carya glabra	WDL	Medium	68.3	95.0	5.5	No change	No change	Medium	Common	Fair	Fair			1	9
white ash	Fraxinus americana	WDL	Medium	47.6	82.1	8.4	Sm. inc.	No change	Low	Common	Fair	Poor			1	10
sweet birch	Betula lenta	NDH	High	35.4	68.0	9.5	Lg. dec.	Lg. dec.	Low	Common	Very Poor	Very Poor			0	11
sassafras	Sassafras albidum	WSL	Low	51.2	65.1	3.6	No change	No change	Medium	Common	Fair	Fair			1	12
mockernut hickory	Carya alba	WDL	Medium	36.6	63.4	6.4	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good			1	13
silver maple	Acer saccharinum	NSH	Low	11	51.0	23.4	Lg. dec.	Sm. dec.	High	Common	Fair	Fair	Infill +	Infill +	1	14
Virginia pine	Pinus virginiana	NDH	High	7.3	47.4	12.4	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	1	15
scarlet oak	Quercus coccinea	WDL	Medium	29.3	43.0	5.8	Sm. inc.	No change	Medium	Rare	Fair	Poor			1	16
black walnut	Juglans nigra	WDH	Low	28	41.0	7.5	Sm. inc.	Sm. inc.	Medium	Rare	Fair	Fair			1	17
eastern white pine	Pinus strobus	WDH	High	13.4	40.7	7.2	Lg. dec.	Lg. dec.	Low	Rare	Very Poor	Very Poor			0	18
shagbark hickory	Carya ovata	WSL	Medium	28	39.6	6.5	No change	Sm. dec.	Medium	Rare	Poor	Very Poor	Infill +		1	19
black locust	Robinia pseudoacacia	NDH	Low	30.5	33.2	10.4	No change	Lg. inc.	Medium	Rare	Poor	Good			1	20
American beech	Fagus grandifolia	WDH	High	35.4	19.3	6.8	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	1	21
sycamore	Platanus occidentalis	NSL	Low	1.2	19.0	14.6	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	22
bitternut hickory	Carya cordiformis	WSL	Low	32.9	17.9	3.4	Sm. inc.	Lg. inc.	High	Rare	Good	Good			1	23
Norway maple	Acer platanoides	NSL	FIA	15.9	17.9	5.1	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	24
green ash	Fraxinus pennsylvanica	WSH	Low	7.3	14.5	4.5	No change	Sm. inc.	Medium	Rare	Poor	Fair	Infill +	Infill +	2	25
pitch pine	Pinus rigida	NSH	High	1.2	13.1	10.1	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	26
American elm	Ulmus americana	WDH	Medium	26.8	13.0	2.6	Sm. inc.	Lg. inc.	Medium	Rare	Fair	Good	Infill +	Infill ++	1	27
boxelder	Acer negundo	WSH	Low	29.3	12.3	6.3	Sm. inc.	Lg. inc.	High	Rare	Good	Good			1	28
ailanthus	Ailanthus altissima	NSL	FIA	46.3	11.8	2.7	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	29
red mulberry	Morus rubra	NSL	Low	6.1	9.0	3.9	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			2	30
eastern redcedar	Juniperus virginiana	WDH	Medium	14.6	8.3	8.5	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	1	31
shingle oak	Quercus imbricaria	NDH	Medium	1.2	7.7	6.0	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	32
yellow birch	Betula alleghaniensis	NDL	High	1.2	6.2	4.8	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	33
American basswood	Tilia americana	WSL	Medium	9.8	5.7	8.7	No change	Sm. dec.	Medium	Rare	Poor	Very Poor	Infill +		1	34
eastern hophornbeam; ironw	Ostrya virginiana	WSL	Low	15.9	5.4	1.5	Lg. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	Infill ++	1	35
swamp white oak	Quercus bicolor	NSL	Low	4.9	5.3	16.3	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	36
American hornbeam; muscle	Carpinus caroliniana	WSL	Low	6.1	4.9	2.9	No change	Sm. inc.	Medium	Rare	Poor	Fair	Infill +	Infill +	1	37
pin oak	Quercus palustris	NSH	Low	1.2	4.7	3.7	No change	No change	Low	Rare	Very Poor	Very Poor			2	38
hackberry	Celtis occidentalis	WDH	Medium	25.6	4.1	1.9	Sm. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	Infill ++	1	39
flowering dogwood	Cornus florida	WDL	Medium	20.7	2.1	0.9	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			1	40
Norway spruce	Picea abies	NSH	FIA	4.9	2.1	6.5	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	41
northern catalpa	Catalpa speciosa	NSHX	FIA	4.9	1.9	5.9	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	42
pawpaw	Asimina triloba	NSL	Low	6.1	1.8	1.0	Lg. dec.	Very Lg. dec.	Medium	Rare	Very Poor	Lost			0	43
eastern hemlock	Tsuga canadensis	NSH	High	9.8	1.5	2.3	No change	Lg. dec.	Low	Rare	Very Poor	Very Poor			2	44
American holly	Ilex opaca	NSL	Medium	1.2	1.4	1.1	Very Lg. dec.	Lg. dec.	Medium	Rare	Lost	Very Poor			2	45
bigtooth aspen	Populus grandidentata	NSL	Medium	4.9	1.0	3.1	Very Lg. dec.	Very Lg. dec.	Medium	Rare	Lost	Lost			0	46
sugar maple	Acer saccharum	WDH	High	4.9	0.6	1.8	Lg. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	Infill ++	2	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
eastern redbud	Cercis canadensis	NSL	Low	9.8	0.6	0.8	Sm. inc.	Lg. inc.	Medium	Rare	Fair	Good	Infill +	Infill ++	2	48
paulownia	Paulownia tomentosa	NSL	FIA	4.9	0.6	1.7	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	49
white spruce	Picea glauca	NSL	Medium	4.9	0.5	1.5	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	50
pin cherry	Prunus pensylvanica	NSL	Low	4.9	0.5	1.4	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	51
swamp chestnut oak	Quercus michauxii	NSL	Low	4.9	0.5	1.4	Lg. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	52
quaking aspen	Populus tremuloides	WDH	High	4.9	0.3	1.0	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	53
white mulberry	Morus alba	NSL	FIA	4.9	0.3	0.9	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	54
serviceberry	Amelanchier spp.	NSL	Low	9.8	0.3	0.4	No change	No change	Medium	Rare	Poor	Poor			1	55
American chestnut	Castanea dentata	NSLX	FIA	4.9	0.1	0.3	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	56
shortleaf pine	Pinus echinata	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate ++	3	57
loblolly pine	Pinus taeda	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate ++	Migrate ++	3	58
bald cypress	Taxodium distichum	NSH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +	3	59
florida maple	Acer barbatum	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat		Migrate +	3	60
striped maple	Acer pensylvanicum	NSL	Medium	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	61
mountain maple	Acer spicatum	NSL	Low	0	0	0	Unknown	Unknown	High	Absent	Unknown	Unknown			0	62
pecan	Carya illinoensis	NSH	Low	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat			3	63
shellbark hickory	Carya laciniosa	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	64
black hickory	Carya texana	NDL	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			0	65
sugarberry	Celtis laevigata	NDH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	66
common persimmon	Diospyros virginiana	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Likely +	Likely +	3	67
black ash	Fraxinus nigra	WSH	Medium	0	0	0	Unknown	Unknown	Low	Modeled	Unknown	Unknown			0	68
sweetgum	Liquidambar styraciflua	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Likely +	Likely +	3	69
sourwood	Oxydendrum arboreum	NDL	High	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	70
redbay	Persea borbonia	NSL	Low	0	0	0	Unknown	Unknown	High	Absent	Unknown	Unknown			0	71
southern red oak	Quercus falcata	WDL	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate ++	Migrate ++	3	72
cherrybark oak; swamp red o	Quercus pagoda	NSL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	73
overcup oak	Quercus lyrata	NSL	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat			3	74
blackjack oak	Quercus marilandica	NSL	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +	Migrate ++	3	75
chinkapin oak	Quercus muehlenbergii	NSL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	76
water oak	Quercus nigra	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate ++	3	77
willow oak	Quercus phellos	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Likely +	Likely +	3	78
post oak	Quercus stellata	WDH	High	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate ++	Migrate ++	3	79
black willow	Salix nigra	NSH	Low	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat	Likely +	Likely +	3	80
winged elm	Ulmus alata	WDL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate ++	3	81
slippery elm	Ulmus rubra	WSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Likely +	Likely +	3	82