

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	8,078.8	3,119.3	136

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	Scenario	Scenario	Scenario	SHIFT	SHIFT				
						RCP45	RCP85	RCP45	RCP85	RCP45	RCP85				
Ash	3			High	14	19	Increase	12	12	Very Good	5	5	Likely	0	0
Hickory	2			Medium	21	34	No Change	11	10	Good	13	11	Infill	26	25
Maple	4	Abundant	5	Low	24	10	Decrease	17	18	Fair	5	7	Migrate	11	12
Oak	6	Common	21	FIA	7		New	16	17	Poor	8	7		37	37
Pine	2	Rare	21				Unknown	10	9	Very Poor	8	9			
Other	30	Absent	18							FIA Only	4	4			
	47		65		66	63		66	66	Unknown	3	2			
											46	45			

Potential Changes in Climate Variables

Temperature (°F)

	Scenario	2009	2039	2069	2099	
Annual Average	CCSM45	46.8	48.8	51.6	51.7	
	CCSM85	46.8	49.5	52.3	55.5	
	GFDL45	46.8	51.2	52.4	53.6	
	GFDL85	46.8	50.1	53.5	58.1	
	HAD45	46.8	49.8	53.3	55.1	
	HAD85	46.8	50.2	54.7	59.9	
Growing Season (May—Sep)	CCSM45	65.3	67.3	69.6	69.9	
	CCSM85	65.3	68.0	70.4	74.2	
	GFDL45	65.3	70.5	71.9	73.8	
	GFDL85	65.3	69.2	73.3	78.6	
	HAD45	65.3	68.3	70.6	72.8	
	HAD85	65.3	68.1	72.6	77.7	
Coldest Month (Average)	CCSM45	17.8	19.4	22.3	22.2	
	CCSM85	17.8	20.4	22.6	24.7	
	GFDL45	17.8	21.1	22.7	23.0	
	GFDL85	17.8	21.6	23.1	25.1	
	HAD45	17.8	19.0	23.2	23.4	
	HAD85	17.8	21.9	25.5	28.9	
Warmest Month (Average)	CCSM45	71.5	74.0	75.3	75.9	
	CCSM85	71.5	75.0	76.7	78.6	
	GFDL45	71.5	74.8	76.4	77.8	
	GFDL85	71.5	76.0	77.9	81.1	
	HAD45	71.5	74.7	76.2	77.5	
	HAD85	71.5	75.5	78.1	81.6	

Precipitation (in)

	Scenario	2009	2039	2069	2099	
Annual Total	CCSM45	33.9	33.6	33.4	34.0	
	CCSM85	33.9	34.1	34.6	34.5	
	GFDL45	33.9	36.2	40.4	39.4	
	GFDL85	33.9	37.6	41.4	41.4	
	HAD45	33.9	34.7	36.2	35.8	
	HAD85	33.9	35.9	34.0	36.5	
Growing Season (May—Sep)	CCSM45	18.7	18.8	18.4	18.9	
	CCSM85	18.7	18.6	19.0	17.8	
	GFDL45	18.7	19.1	22.1	21.1	
	GFDL85	18.7	20.8	21.5	21.0	
	HAD45	18.7	18.4	17.3	17.7	
	HAD85	18.7	18.6	15.4	15.9	

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
green ash	Fraxinus pennsylvanica	WSH	Low	51.7	773.7	18.7	No change	No change	Medium	Abundant	Good	Good	Infill ++	Infill ++	1	1
American elm	Ulmus americana	WDH	Medium	65.3	663.3	12.1	No change	No change	Medium	Abundant	Good	Good	Infill ++	Infill ++	1	2
black cherry	Prunus serotina	WDL	Medium	60.6	572.1	13.5	No change	Sm. dec.	Low	Abundant	Fair	Fair	Infill +	Infill +	0	3
boxelder	Acer negundo	WSH	Low	54.1	522.7	14.6	Sm. dec.	Sm. dec.	High	Abundant	Good	Good	Infill ++	Infill ++	1	4
American basswood	Tilia americana	WSL	Medium	51.6	505.9	13.1	Sm. dec.	Lg. dec.	Medium	Abundant	Fair	Fair	Infill +	Infill +	0	5
sugar maple	Acer saccharum	WDH	High	31.5	434.0	16.0	No change	Sm. dec.	High	Common	Good	Fair	Infill ++	Infill +	1	6
white ash	Fraxinus americana	WDL	Medium	50.5	336.8	12.3	No change	No change	Low	Common	Poor	Poor	Infill +	Infill +	0	7
black walnut	Juglans nigra	WDH	Low	28.4	290.9	17.2	No change	No change	Medium	Common	Fair	Fair	Infill +	Infill +	1	8
eastern white pine	Pinus strobus	WDH	High	24.4	275.6	17.6	Sm. dec.	Lg. dec.	Low	Common	Poor	Very Poor	Infill +		0	9
red pine	Pinus resinosa	NSH	Medium	11.1	223.2	17.5	Lg. dec.	Lg. dec.	Low	Common	Very Poor	Very Poor			2	10
northern red oak	Quercus rubra	WDH	Medium	39.7	222.1	8.6	No change	No change	High	Common	Good	Good	Infill ++	Infill ++	1	11
black willow	Salix nigra	NSH	Low	15.8	201.1	18.8	Sm. dec.	No change	Low	Common	Poor	Poor	Infill +	Infill +	0	12
quaking aspen	Populus tremuloides	WDH	High	33.2	199.1	11.8	Sm. dec.	Sm. dec.	Medium	Common	Poor	Poor	Infill +	Infill +	0	13
bur oak	Quercus macrocarpa	NDH	Medium	37	159.2	8.2	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good	Infill ++	Infill ++	2	14
bitternut hickory	Carya cordiformis	WSL	Low	24.8	139.0	9.6	No change	Sm. inc.	High	Common	Good	Very Good	Infill ++	Infill ++	1	15
shagbark hickory	Carya ovata	WSL	Medium	28.5	124.7	5.7	Sm. inc.	Sm. inc.	Medium	Common	Good	Good	Infill ++	Infill ++	1	16
black ash	Fraxinus nigra	WSH	Medium	22.3	123.1	5.9	Lg. dec.	Lg. dec.	Low	Common	Very Poor	Very Poor			0	17
silver maple	Acer saccharinum	NSH	Low	9.7	116.8	20.2	No change	No change	High	Common	Good	Good	Infill ++	Infill ++	2	18
white oak	Quercus alba	WDH	Medium	27.2	112.9	7.6	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good	Infill ++	Infill ++	2	19
red maple	Acer rubrum	WDH	High	20.7	93.2	5.2	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good	Infill ++	Infill ++	1	20
eastern hophornbeam; ironw	Ostrya virginiana	WSL	Low	19.8	91.3	5.2	Sm. inc.	No change	High	Common	Very Good	Good	Infill ++	Infill ++	1	21
eastern cottonwood	Populus deltoides	NSH	Low	13.6	85.3	15.1	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good	Infill ++	Infill ++	2	22
amarok (native)	Larix laricina	NSH	High	9.9	84.0	7.4	Sm. dec.	Sm. dec.	Low	Common	Poor	Poor			0	23
northern white-cedar	Thuja occidentalis	WSH	High	7.2	60.9	11.1	Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor			0	24
black locust	Robinia pseudoacacia	NDH	Low	1.2	54.8	38.6	No change	No change	Medium	Common	Fair	Fair	Infill +	Infill +	2	25
Norway spruce	Picea abies	NSH	FIA	12.6	53.7	11.4	Unknown	Unknown	NA	Common	NNIS	NNIS			0	26
Siberian elm	Ulmus pumila	NDH	FIA	5.2	45.8	17.0	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	27
bigtooth aspen	Populus grandidentata	NSL	Medium	3.7	37.5	8.8	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			2	28
slippery elm	Ulmus rubra	WSL	Low	15.8	32.1	3.3	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	1	29
hackberry	Celtis occidentalis	WDH	Medium	3.7	29.2	6.9	Lg. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	Infill ++	2	30
paper birch	Betula papyrifera	WDH	High	5	28.3	5.0	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	31
northern pin oak	Quercus ellipsoidalis	NSH	Medium	13.6	27.3	4.4	Lg. dec.	Lg. dec.	High	Rare	Poor	Poor		Infill +	2	32
eastern redcedar	Juniperus virginiana	WDH	Medium	16.3	22.8	5.3	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	33
black oak	Quercus velutina	WDH	High	2.5	20.0	7.1	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	34
American beech	Fagus grandifolia	WDH	High	2.5	17.2	6.1	No change	No change	Medium	Rare	Poor	Poor	Infill +		2	35
pin cherry	Prunus pensylvanica	NSL	Low	1.2	16.7	11.8	Very Lg. dec.	Very Lg. dec.	Medium	Rare	Lost	Lost			0	36
white mulberry	Morus alba	NSL	FIA	1.2	16.5	11.6	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	37
swamp white oak	Quercus bicolor	NSL	Low	7.4	14.2	4.0	Sm. inc.	Sm. inc.	Medium	Rare	Fair	Fair	Infill +	Infill +	2	38
white spruce	Picea glauca	NSL	Medium	6.4	9.7	3.0	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	39
American hornbeam; musclev	Carpinus caroliniana	WSL	Low	7.4	8.9	2.6	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	40
yellow birch	Betula alleghaniensis	NDL	High	2.5	7.6	2.7	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			2	41
peachleaf willow	Salix amygdaloides	NSLX	FIA	1.2	7.0	4.9	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	42
red mulberry	Morus rubra	NSL	Low	3.7	5.2	1.2	Lg. inc.	Sm. inc.	Medium	Rare	Good	Fair	Infill ++	Infill +	2	43
black spruce	Picea mariana	NSH	High	1.2	4.4	3.1	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	44
chokecherry	Prunus virginiana	NSLX	FIA	7.4	3.1	0.8	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	45
butternut	Juglans cinerea	NSLX	FIA	1.2	3.0	2.1	Unknown	Unknown	Low	Rare	FIA Only	FIA Only			0	46
wild plum	Prunus americana	NSLX	FIA	1.2	1.1	0.8	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
Ohio buckeye	Aesculus glabra	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +		3	48
serviceberry	Amelanchier spp.	NSL	Low	0	0	0	Unknown	Unknown	Medium	Modeled	Unknown	Unknown			0	49
pignut hickory	Carya glabra	WDL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	50
black hickory	Carya texana	NDL	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	51
mockernut hickory	Carya alba	WDL	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	52
eastern redbud	Cercis canadensis	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	53
common persimmon	Diospyros virginiana	NSL	Low	0	0	0	Unknown	New Habitat	High	Absent	Unknown	New Habitat			3	54
honeylocust	Gleditsia triacanthos	NSH	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	55
yellow-poplar	Liriodendron tulipifera	WDH	High	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			3	56
Osage-orange	Maclura pomifera	NDH	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	57
sycamore	Platanus occidentalis	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	58
shingle oak	Quercus imbricaria	NDH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +	3	59
blackjack oak	Quercus marilandica	NSL	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			3	60
chinkapin oak	Quercus muehlenbergii	NSL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	61
pin oak	Quercus palustris	NSH	Low	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	62
Shumard oak	Quercus shumardii	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat		Migrate +	3	63
post oak	Quercus stellata	WDH	High	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +	Migrate ++	3	64
sassafras	Sassafras albidum	WSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	65
American mountain-ash	Sorbus americana	NSL	Low	0	0	0	Unknown	Unknown	Low	Absent	Unknown	Unknown			0	66