

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	11,035	4,260.7	129

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	2			High	22	22	27	Very Good	3	3	Likely	1
Hickory	4			Medium	33	53	14	Good	24	24	Infill	29
Maple	5	Abundant	0	Low	31	13	17	Fair	9	9	Migrate	9
Oak	13	Common	21	FIA	6		25	Poor	10	10		12
Pine	5	Rare	43				9	Very Poor	11	10		
Other	35	Absent	27				10	FIA Only	2	2		
	64		91		92	88	92	Unknown	4	3		39
									63	61		40

Potential Changes in Climate Variables

Temperature (°F)

	Scenario	2009	2039	2069	2099	
Annual Average	CCSM45	53.8	55.6	57.7	58.0	
	CCSM85	53.8	55.9	58.4	61.4	
	GFDL45	53.8	58.9	59.3	60.4	
	GFDL85	53.8	57.0	60.5	64.4	
	HAD45	53.8	56.3	59.5	61.0	
HAD85	53.8	56.4	60.3	64.8		
Growing Season (May—Sep)	CCSM45	70.0	71.8	73.5	74.0	
	CCSM85	70.0	72.0	74.4	78.0	
	GFDL45	70.0	75.7	76.2	77.5	
	GFDL85	70.0	73.7	77.6	81.8	
	HAD45	70.0	72.8	75.6	77.5	
HAD85	70.0	72.3	76.8	81.6		
Coldest Month (Average)	CCSM45	29.8	31.8	33.3	33.7	
	CCSM85	29.8	32.2	33.5	35.2	
	GFDL45	29.8	33.1	33.9	34.5	
	GFDL85	29.8	32.9	34.2	35.8	
	HAD45	29.8	31.1	33.4	33.7	
HAD85	29.8	31.9	33.7	35.9		
Warmest Month (Average)	CCSM45	76.0	78.1	79.0	79.1	
	CCSM85	76.0	78.3	79.9	81.6	
	GFDL45	76.0	78.9	80.7	81.9	
	GFDL85	76.0	80.1	82.3	84.9	
	HAD45	76.0	79.2	80.7	81.7	
HAD85	76.0	79.0	81.5	84.7		

Precipitation (in)

	Scenario	2009	2039	2069	2099	
Annual Total	CCSM45	46.7	49.8	51.9	55.0	
	CCSM85	46.7	50.5	52.8	57.7	
	GFDL45	46.7	52.4	56.1	56.2	
	GFDL85	46.7	50.0	56.0	57.9	
	HAD45	46.7	49.7	50.9	50.5	
HAD85	46.7	53.0	49.4	52.2		
Growing Season (May—Sep)	CCSM45	21.1	25.1	25.8	27.7	
	CCSM85	21.1	24.2	25.5	27.2	
	GFDL45	21.1	22.9	24.4	25.7	
	GFDL85	21.1	21.9	24.3	25.2	
	HAD45	21.1	22.8	21.4	20.3	
HAD85	21.1	23.2	20.2	20.2		

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-DGP30 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	77.5	455.3	15.5	No change	No change	High	Common	Good	Good	Infill ++	Infill ++	2	1
sweetgum	Liquidambar styraciflua	WDH	High	26.7	386.9	25.9	Sm. inc.	Sm. inc.	Medium	Common	Good	Good	Infill ++	Infill ++	2	2
yellow-poplar	Liriodendron tulipifera	WDH	High	49.2	289.4	16.6	No change	Sm. dec.	High	Common	Good	Fair	Infill ++	Infill +	2	3
pitch pine	Pinus rigida	NSH	High	11.7	283.1	27.5	Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor			0	4
white oak	Quercus alba	WDH	Medium	24.2	267.0	14.9	No change	No change	High	Common	Good	Good	Infill ++	Infill ++	2	5
black cherry	Prunus serotina	WDL	Medium	62.1	228.6	11.4	No change	No change	Low	Common	Poor	Poor	Infill +	Infill +	2	6
black walnut	Juglans nigra	WDH	Low	36.9	206.4	13.2	Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor	Infill +	Infill +	2	7
black oak	Quercus velutina	WDH	High	32.6	178.9	11.5	Sm. inc.	Sm. inc.	Medium	Common	Good	Good	Infill ++	Infill ++	2	8
white ash	Fraxinus americana	WDL	Medium	40.4	178.5	14.4	Sm. dec.	Sm. dec.	Low	Common	Poor	Poor	Infill +	Infill +	2	9
eastern redcedar	Juniperus virginiana	WDH	Medium	24.5	127.4	14.5	Sm. inc.	Sm. inc.	Medium	Common	Good	Good	Infill ++	Infill ++	2	10
chestnut oak	Quercus prinus	NDH	High	23.3	116.9	8.3	No change	Sm. dec.	High	Common	Good	Fair	Infill ++	Infill +	2	11
American beech	Fagus grandifolia	WDH	High	32	95.9	6.4	No change	No change	Medium	Common	Fair	Fair	Infill +	Infill +	2	12
blackgum	Nyssa sylvatica	WDL	Medium	35.5	94.0	5.3	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good	Infill ++	Infill ++	2	13
Norway maple	Acer platanoides	NSL	FIA	14.4	88.3	14.6	Unknown	Unknown	NA	Common	NNIS	NNIS			0	14
eastern white pine	Pinus strobus	WDH	High	14.5	78.3	12.4	Lg. dec.	Very Lg. dec.	Low	Common	Very Poor	Lost			0	15
sassafras	Sassafras albidum	WSL	Low	45.8	77.4	5.3	No change	Sm. dec.	Medium	Common	Fair	Poor	Infill +	Infill +	2	16
northern red oak	Quercus rubra	WDH	Medium	33.7	74.2	6.6	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good	Infill ++	Infill ++	2	17
boxelder	Acer negundo	WSH	Low	26.8	68.7	7.0	No change	No change	High	Common	Good	Good	Infill ++	Infill ++	2	18
green ash	Fraxinus pennsylvanica	WSH	Low	10.9	67.5	10.9	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			2	19
black locust	Robinia pseudoacacia	NDH	Low	16.3	58.2	8.5	No change	Sm. inc.	Medium	Common	Fair	Good	Infill +	Infill ++	2	20
mockernut hickory	Carya alba	WDL	Medium	20.6	51.6	5.9	Sm. inc.	Lg. inc.	High	Common	Very Good	Very Good	Infill ++	Infill ++	2	21
scarlet oak	Quercus coccinea	WDL	Medium	17.8	47.4	5.1	Sm. inc.	Sm. inc.	Medium	Rare	Fair	Fair	Infill +	Infill +	2	22
pin oak	Quercus palustris	NSH	Low	25.3	47.4	8.5	No change	Sm. dec.	Low	Rare	Very Poor	Very Poor			2	23
silver maple	Acer saccharinum	NSH	Low	9.7	46.3	10.0	No change	No change	High	Rare	Fair	Fair	Infill +	Infill +	2	24
Virginia pine	Pinus virginiana	NDH	High	4.5	44.1	10.2	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	25
eastern cottonwood	Populus deltoides	NSH	Low	5.4	40.7	15.9	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	26
shagbark hickory	Carya ovata	WSL	Medium	6.3	33.9	8.1	No change	No change	Medium	Rare	Poor	Poor	Infill +		2	27
sweet birch	Betula lenta	NDH	High	16.9	33.4	9.0	Lg. dec.	Lg. dec.	Low	Rare	Very Poor	Very Poor			0	28
American elm	Ulmus americana	WDL	Medium	25.4	25.5	3.0	Sm. inc.	Lg. inc.	Medium	Rare	Fair	Good	Infill +		2	29
pignut hickory	Carya glabra	WDL	Medium	11.8	25.1	3.7	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	30
southern red oak	Quercus falcata	WDL	Medium	6.1	24.4	6.0	Sm. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	Infill ++	2	31
black willow	Salix nigra	NSH	Low	1.8	23.0	10.6	Sm. dec.	No change	Low	Rare	Very Poor	Very Poor			2	32
willow oak	Quercus phellos	NSL	Low	4.5	22.9	4.2	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	33
American hornbeam; muscle	Carpinus caroliniana	WSL	Low	15.4	22.1	2.8	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	2	34
slippery elm	Ulmus rubra	WSL	Low	10	16.0	3.9	No change	No change	Medium	Rare	Poor	Poor			0	35
paulownia	Paulownia tomentosa	NSL	FIA	7.1	15.7	28.2	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	36
common persimmon	Diospyros virginiana	NSL	Low	2.8	15.5	7.4	No change	No change	High	Rare	Fair	Fair	Infill +	Infill +	2	37
Atlantic white-cedar	Chamaecyparis thyoides	NSH	Low	1.8	13.9	6.4	No change	No change	Low	Rare	Very Poor	Very Poor			0	38
American holly	Ilex opaca	NSL	Medium	6.1	10.7	3.0	Sm. inc.	Sm. inc.	Medium	Rare	Fair	Fair	Infill +	Infill +	2	39
bitternut hickory	Carya cordiformis	WSL	Low	18.1	10.7	7.9	Lg. inc.	Lg. inc.	High	Rare	Good	Good			2	40
hackberry	Celtis occidentalis	WDH	Medium	6.3	10.7	6.0	No change	No change	High	Rare	Fair	Fair			0	41
Osage-orange	Maclura pomifera	NDH	Medium	12.7	10.6	9.2	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor			0	42
sugar maple	Acer saccharum	WDH	High	16.3	10.4	4.0	Lg. inc.	Lg. inc.	High	Rare	Good	Good			2	43
sycamore	Platanus occidentalis	NSL	Low	16.3	9.9	4.1	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	2	44
ailanthus	Ailanthus altissima	NSL	FIA	9	9.9	2.7	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	45
red mulberry	Morus rubra	NSL	Low	3.5	7.1	25.6	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	46
river birch	Betula nigra	NSL	Low	8.1	6.6	3.9	No change	Sm. inc.	Medium	Rare	Poor	Fair	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
flowering dogwood	Cornus florida	WDL	Medium	19.9	5.5	1.4	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	48
post oak	Quercus stellata	WDH	High	1.8	5.1	2.4	Lg. inc.	Lg. inc.	High	Rare	Good	Good			2	49
sweetbay	Magnolia virginiana	NSL	Medium	2.7	4.0	1.2	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	50
American basswood	Tilia americana	WSL	Medium	4.5	3.1	1.9	Very Lg. dec.	Very Lg. dec.	Medium	Rare	Lost	Lost			0	51
Norway spruce	Picea abies	NSH	FIA	10.6	2.6	3.1	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	52
Kentucky coffeetree	Gymnocladus dioicus	NSLX	FIA	0.9	2.3	2.1	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	53
eastern hophornbeam; ironw	Ostrya virginiana	WSL	Low	11.8	2.1	0.8	Lg. inc.	Lg. inc.	High	Rare	Good	Good			2	54
gray birch	Betula populifolia	NSL	Low	4.5	2.1	1.5	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	55
shortleaf pine	Pinus echinata	WDH	High	0.9	1.7	1.5	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	56
bear oak; scrub oak	Quercus ilicifolia	NSLX	FIA	0.9	1.1	1.0	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	57
yellow birch	Betula alleghaniensis	NDL	High	0.9	0.7	0.6	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	58
loblolly pine	Pinus taeda	WDH	High	3.3	0.6	1.8	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	59
blackjack oak	Quercus marilandica	NSL	Medium	0.9	0.4	0.4	Lg. inc.	Lg. inc.	High	Rare	Good	Good			2	60
laurel oak	Quercus laurifolia	NDH	Medium	3.6	0.3	1.2	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	61
swamp chestnut oak	Quercus michauxii	NSL	Low	3.3	0.3	0.8	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	62
eastern hemlock	Tsuga canadensis	NSH	High	3.6	0.2	0.7	Lg. dec.	Lg. dec.	Low	Rare	Very Poor	Very Poor			0	63
serviceberry	Amelanchier spp.	NSL	Low	3.6	0.1	0.3	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	64
slash pine	Pinus elliotii	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	65
longleaf pine	Pinus palustris	NSH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	66
pond pine	Pinus serotina	NSH	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat	Likely +	Likely +	3	67
bald cypress	Taxodium distichum	NSH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	68
pond cypress	Taxodium ascendens	NSH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	69
florida maple	Acer barbatum	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat		Migrate +	3	70
cittamwood/gum bumelia	Sideroxylon lanuginosum ssp.	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			0	71
water hickory	Carya aquatica	NSL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	72
pecan	Carya illinoensis	NSH	Low	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat		Migrate +	3	73
black hickory	Carya texana	NDL	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			0	74
sugarberry	Celtis laevigata	NDH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	75
eastern redbud	Cercis canadensis	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	76
loblolly-bay	Gordonia lasianthus	NSH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	77
silverbell	Halesia spp.	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	78
cucumbertree	Magnolia acuminata	NSL	Low	0	0	0	Unknown	Unknown	Medium	Modeled	Unknown	Unknown			0	79
water tupelo	Nyssa aquatica	NSH	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	80
swamp tupelo	Nyssa biflora	NDH	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat	Migrate +	Migrate ++	3	81
sourwood	Oxydendrum arboreum	NDL	High	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	82
redbay	Persea borbonia	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	83
quaking aspen	Populus tremuloides	WDH	High	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	84
swamp white oak	Quercus bicolor	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	85
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	86
overcup oak	Quercus lyrata	NSL	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat		Migrate +	3	87
chinkapin oak	Quercus muehlenbergii	NSL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	88
water oak	Quercus nigra	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate ++	3	89
live oak	Quercus virginiana	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			0	90
bluejack oak	Quercus incana	NSL	Low	0	0	0	Unknown	New Habitat	Medium	Absent	Unknown	New Habitat			3	91
winged elm	Ulmus alata	WDL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate ++	3	92