

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	8,486.2	3,276.5	235

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	
		Abundant	Common	High	Low	Scenario	Scenario	Scenario	Scenario	SHIFT	SHIFT
				Reliability	Adaptability	RCP45	RCP85	RCP45	RCP85	RCP45	RCP85
Ash	3										
Hickory	3										
Maple	5	4		22	16	Increase	18	20	Very Good	4	4
Oak	6	18		23	39	No Change	5	5	Good	12	16
Pine	3	28		20	11	Decrease	23	21	Fair	7	5
Other	30	19		4		New	15	15	Poor	10	9
	50	69		69	66	Unknown	8	8	Very Poor	9	9
							69	69	FIA Only	1	1
									Unknown	4	4
										47	48

Potential Changes in Climate Variables

Temperature (°F)

	Scenario	2009	2039	2069	2099	
Annual Average	CCSM45	47.4	49.3	51.5	51.7	
	CCSM85	47.4	49.8	52.3	55.4	
	GFDL45	47.4	50.1	53.3	54.5	
	GFDL85	47.4	50.6	54.6	59.1	
	HAD45	47.4	50.3	53.5	55.1	
	HAD85	47.4	50.5	54.6	59.8	
Growing Season (May—Sep)	CCSM45	64.4	66.5	68.3	68.7	
	CCSM85	64.4	66.7	69.2	72.7	
	GFDL45	64.4	67.2	70.7	72.1	
	GFDL85	64.4	67.7	72.1	76.8	
	HAD45	64.4	67.3	70.0	72.2	
	HAD85	64.4	66.9	71.5	77.2	
Coldest Month Average	CCSM45	21.4	23.0	24.8	25.4	
	CCSM85	21.4	24.2	25.2	27.5	
	GFDL45	21.4	24.8	26.5	27.7	
	GFDL85	21.4	25.3	27.2	29.7	
	HAD45	21.4	24.0	26.6	26.9	
	HAD85	21.4	25.0	27.2	30.4	
Warmest Month Average	CCSM45	70.8	73.3	74.3	74.3	
	CCSM85	70.8	73.5	75.1	76.8	
	GFDL45	70.8	73.5	75.2	76.5	
	GFDL85	70.8	74.2	76.8	79.5	
	HAD45	70.8	73.9	75.3	76.6	
	HAD85	70.8	73.3	75.8	79.7	

Precipitation (in)

	Scenario	2009	2039	2069	2099	
Annual Total	CCSM45	47.3	46.2	44.2	50.5	
	CCSM85	47.3	46.3	48.8	52.4	
	GFDL45	47.3	51.0	53.5	52.2	
	GFDL85	47.3	49.4	52.2	54.9	
	HAD45	47.3	49.3	52.5	51.1	
	HAD85	47.3	50.9	51.2	52.6	
Growing Season (May—Sep)	CCSM45	19.5	20.3	18.4	20.1	
	CCSM85	19.5	18.9	20.4	20.5	
	GFDL45	19.5	19.3	18.5	18.9	
	GFDL85	19.5	19.7	18.4	18.4	
	HAD45	19.5	20.8	20.6	20.5	
	HAD85	19.5	19.6	19.5	20.5	

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
eastern white pine	Pinus strobus	WDH	High	95.3	2919.6	29.5	Lg. dec.	Lg. dec.	Low	Abundant	Poor	Poor			0	1
red maple	Acer rubrum	WDH	High	95.3	2500.0	25.2	Sm. dec.	Sm. dec.	High	Abundant	Good	Good			1	2
northern red oak	Quercus rubra	WDH	Medium	83.5	1032.6	11.9	Sm. dec.	Sm. dec.	High	Abundant	Good	Good	Infill ++	Infill ++	1	3
eastern hemlock	Tsuga canadensis	NSH	High	58.8	694.2	11.3	Sm. dec.	Lg. dec.	Low	Abundant	Fair	Poor	Infill +	Infill +	0	4
black oak	Quercus velutina	WDH	High	50.5	442.8	8.4	Sm. inc.	Sm. inc.	Medium	Common	Good	Good	Infill ++	Infill ++	1	5
sweet birch	Betula lenta	NDH	High	63.5	318.2	4.8	No change	Sm. dec.	Low	Common	Poor	Poor	Infill +	Infill +	0	6
white ash	Fraxinus americana	WDL	Medium	52.9	282.4	5.1	Sm. inc.	Sm. inc.	Low	Common	Fair	Fair	Infill +	Infill +	1	7
white oak	Quercus alba	WDH	Medium	51.7	246.1	4.6	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good	Infill ++	Infill ++	1	8
American beech	Fagus grandifolia	WDH	High	40.1	186.1	4.5	Sm. inc.	Sm. inc.	Medium	Common	Good	Good	Infill ++	Infill ++	1	9
American elm	Ulmus americana	WDH	Medium	30.5	162.8	5.1	Sm. dec.	No change	Medium	Common	Poor	Fair	Infill +	Infill +	2	10
paper birch	Betula papyrifera	WDH	High	57.7	140.9	2.4	Sm. dec.	Lg. dec.	Medium	Common	Poor	Poor	Infill +	Infill +	0	11
yellow birch	Betula alleghaniensis	NDL	High	30.6	139.2	4.4	Sm. inc.	Sm. inc.	Medium	Common	Good	Good	Infill ++	Infill ++	1	12
black walnut	Juglans nigra	WDH	Low	1.2	122.2	100.0	Very Lg. dec.	Lg. dec.	Medium	Common	Lost	Poor			0	13
black cherry	Prunus serotina	WDL	Medium	36.4	99.8	2.6	Lg. inc.	Lg. inc.	Low	Common	Good	Good	Infill ++	Infill ++	1	14
pignut hickory	Carya glabra	WDL	Medium	15.3	99.5	6.3	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good	Infill ++	Infill ++	2	15
sugar maple	Acer saccharum	WDH	High	33	95.9	2.8	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good	Infill ++	Infill ++	1	16
bigtooth aspen	Populus grandidentata	NSL	Medium	13	94.5	7.0	No change	Sm. dec.	Medium	Common	Fair	Poor	Infill +	Infill +	2	17
red spruce	Picea rubens	NDH	High	10.6	91.6	8.3	Lg. dec.	Lg. dec.	Low	Common	Very Poor	Very Poor			0	18
scarlet oak	Quercus coccinea	WDL	Medium	20	81.2	3.9	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good	Infill ++	Infill ++	2	19
gray birch	Betula populifolia	NSL	Low	21.2	74.2	3.4	No change	No change	Medium	Common	Fair	Fair		Infill +	1	20
swamp white oak	Quercus bicolor	NSL	Low	7.1	70.2	9.6	Sm. dec.	Sm. dec.	Medium	Common	Poor	Poor		Infill +	2	21
quaking aspen	Populus tremuloides	WDH	High	21	50.9	2.3	Sm. inc.	Sm. inc.	Medium	Common	Good	Good	Infill ++	Infill ++	1	22
shagbark hickory	Carya ovata	WSL	Medium	14	45.1	3.1	Sm. inc.	Sm. inc.	Medium	Rare	Fair	Fair	Infill +	Infill +	2	23
Siberian elm	Ulmus pumila	NDH	FIA	1.2	40.7	33.3	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	24
American basswood	Tilia americana	WSL	Medium	8.2	36.3	4.3	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	1	25
balsam fir	Abies balsamea	NDH	High	4.7	31.5	6.4	Lg. dec.	Lg. dec.	Low	Rare	Very Poor	Very Poor			0	26
red pine	Pinus resinosa	NSH	Medium	9.3	24.1	2.3	Lg. dec.	Lg. dec.	Low	Rare	Very Poor	Very Poor			0	27
black willow	Salix nigra	NSH	Low	2.4	19.1	7.8	Sm. dec.	Sm. dec.	Low	Rare	Very Poor	Very Poor			0	28
American hornbeam; musclev	Carpinus caroliniana	WSL	Low	8.2	13.5	1.6	Sm. dec.	No change	Medium	Rare	Very Poor	Very Poor		Infill +	2	29
pitch pine	Pinus rigida	NSH	High	8.2	12.2	1.4	No change	Sm. dec.	Medium	Rare	Poor	Very Poor	Infill +		2	30
black locust	Robinia pseudoacacia	NDH	Low	2.2	12.2	4.5	Sm. inc.	Lg. inc.	Medium	Rare	Fair	Good	Infill +		2	31
eastern hophornbeam; ironw	Ostrya virginiana	WSL	Low	9.4	10.5	1.1	Sm. dec.	Sm. inc.	High	Rare	Poor	Good		Infill ++	2	32
blackgum	Nyssa sylvatica	WDL	Medium	4.7	10.3	2.1	Lg. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	Infill ++	2	33
silver maple	Acer saccharinum	NSH	Low	1.2	9.0	7.4	Sm. dec.	Lg. inc.	High	Rare	Poor	Good			2	34
eastern redcedar	Juniperus virginiana	WDH	Medium	4.7	7.4	1.5	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	35
striped maple	Acer pensylvanicum	NSL	Medium	4.7	7.2	1.5	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	36
tamarack (native)	Larix laricina	NSH	High	3.5	5.7	1.6	Lg. dec.	Lg. dec.	Low	Rare	Very Poor	Very Poor			0	37
American chestnut	Castanea dentata	NSLX	FIA	4.7	2.9	0.6	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	38
eastern cottonwood	Populus deltoides	NSH	Low	1.2	2.6	2.2	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	39
white spruce	Picea glauca	NSL	Medium	1.2	2.4	2.0	Very Lg. dec.	Very Lg. dec.	Medium	Rare	Lost	Lost			0	40
chestnut oak	Quercus prinus	NDH	High	1.2	2.4	2.0	Lg. inc.	Lg. inc.	High	Rare	Good	Good			2	41
green ash	Fraxinus pennsylvanica	WSL	Low	2.4	2.1	0.9	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	42
sassafras	Sassafras albidum	WSL	Low	1.2	2.1	1.7	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	43
black ash	Fraxinus nigra	WSH	Medium	2.4	1.5	0.6	Very Lg. dec.	Very Lg. dec.	Low	Rare	Lost	Lost			0	44
Norway maple	Acer platanoides	NSL	FIA	1.2	1.2	1.0	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	45
Norway spruce	Picea abies	NSH	FIA	1.2	0.9	0.8	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	46
serviceberry	Amelanchier spp.	NSL	Low	1.2	0.7	0.5	Very Lg. dec.	Very Lg. dec.	Medium	Rare	Lost	Lost			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
bitternut hickory	<i>Carya cordiformis</i>	WSL	Low	1.2	0.6	0.5	Lg. dec.	No change	High	Rare	Poor	Fair			0	48
pin cherry	<i>Prunus pensylvanica</i>	NSL	Low	1.2	0.6	0.5	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	49
flowering dogwood	<i>Cornus florida</i>	WDL	Medium	1.2	0.4	0.3	Sm. inc.	Lg. inc.	Medium	Rare	Fair	Good			0	50
shortleaf pine	<i>Pinus echinata</i>	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	51
loblolly pine	<i>Pinus taeda</i>	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	52
Virginia pine	<i>Pinus virginiana</i>	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +	3	53
mountain maple	<i>Acer spicatum</i>	NSL	Low	0	0	0	Unknown	Unknown	High	Absent	Unknown	Unknown			0	54
Ohio buckeye	<i>Aesculus glabra</i>	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	55
cittamwood/gum bumelia	<i>Sideroxylon lanuginosum ssp.</i>	NSL	Low	0	0	0	New Habitat	Unknown	High	Absent	New Habitat	Unknown			0	56
black hickory	<i>Carya texana</i>	NDL	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			0	57
mockernut hickory	<i>Carya alba</i>	WDL	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	58
sugarberry	<i>Celtis laevigata</i>	NDH	Medium	0	0	0	Unknown	New Habitat	Medium	Absent	Unknown	New Habitat			0	59
American holly	<i>Ilex opaca</i>	NSL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +	3	60
sweetgum	<i>Liquidambar styraciflua</i>	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate ++	3	61
yellow-poplar	<i>Liriodendron tulipifera</i>	WDH	High	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +	Migrate ++	3	62
bigleaf magnolia	<i>Magnolia macrophylla</i>	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	63
sycamore	<i>Platanus occidentalis</i>	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +	3	64
southern red oak	<i>Quercus falcata</i>	WDL	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			3	65
blackjack oak	<i>Quercus marilandica</i>	NSL	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			3	66
willow oak	<i>Quercus phellos</i>	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	67
post oak	<i>Quercus stellata</i>	WDH	High	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			3	68
winged elm	<i>Ulmus alata</i>	WDL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			0	69