

**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  
 8,200.0    3,166.0    150

**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	3			High	17	23	Increase	26	27	Very Good	14	17	Likely	3	3
Hickory	5			Medium	24	44	No Change	7	9	Good	14	11	Infill	5	5
Maple	4	Abundant	3	Low	32	8	Decrease	21	18	Fair	8	10	Migrate	4	7
Oak	10	Common	35	FIA	5		New	14	15	Poor	11	10			
Pine	2	Rare	21				Unknown	10	9	Very Poor	5	3			
Other	35	Absent	18							FIA Only	2	2			
	<b>59</b>		<b>77</b>		<b>78</b>	<b>75</b>		<b>78</b>	<b>78</b>	Unknown	5	4			
											<b>59</b>	<b>57</b>			

**Potential Changes in Climate Variables**

**Temperature (°F)**

Scenario	2009	2039	2069	2099		
Annual	CCSM45	58.1	59.8	62.2	62.4	
Average	CCSM85	58.1	60.3	63.0	66.0	
	GFDL45	58.1	61.3	63.0	63.8	
	GFDL85	58.1	60.7	64.1	67.6	
	HAD45	58.1	60.6	63.8	65.1	
	HAD85	58.1	61.0	65.6	69.4	
Growing Season	CCSM45	73.3	75.0	77.0	77.5	
	CCSM85	73.3	75.3	78.4	82.2	
May—Sep	GFDL45	73.3	77.0	79.0	80.3	
	GFDL85	73.3	76.4	80.5	84.5	
	HAD45	73.3	76.6	79.8	81.3	
	HAD85	73.3	77.0	83.7	87.2	
Coldest Month	CCSM45	34.8	36.7	38.2	38.5	
	CCSM85	34.8	38.0	39.1	40.7	
Average	GFDL45	34.8	38.5	38.4	38.7	
	GFDL85	34.8	36.3	37.4	37.9	
	HAD45	34.8	35.2	37.4	37.8	
	HAD85	34.8	36.6	38.4	40.0	
Warmest Month	CCSM45	78.5	80.0	81.2	81.4	
	CCSM85	78.5	80.5	82.3	84.0	
Average	GFDL45	78.5	81.4	82.9	83.8	
	GFDL85	78.5	81.6	84.0	86.3	
	HAD45	78.5	82.9	85.6	86.2	
	HAD85	78.5	84.3	89.0	90.5	

**Precipitation (in)**

Scenario	2009	2039	2069	2099		
Annual	CCSM45	50.8	52.4	57.6	55.7	
Total	CCSM85	50.8	56.9	56.8	61.1	
	GFDL45	50.8	57.7	60.7	63.6	
	GFDL85	50.8	57.9	61.3	64.6	
	HAD45	50.8	48.5	52.7	52.9	
	HAD85	50.8	50.8	47.2	52.1	
Growing Season	CCSM45	20.9	20.2	21.5	21.0	
	CCSM85	20.9	22.0	19.6	21.3	
May—Sep	GFDL45	20.9	24.0	24.3	25.2	
	GFDL85	20.9	24.0	24.8	25.5	
	HAD45	20.9	19.6	19.1	19.1	
	HAD85	20.9	20.3	15.7	17.0	

**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.

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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 redcedar	Juniperus virginiana	WDH	Medium	61	1080.0	19.1	No change	No change	Medium	Abundant	Good	Good			1	1
hackberry	Celtis occidentalis	WDH	Medium	51.2	667.4	13.6	Sm. dec.	Sm. dec.	High	Abundant	Good	Good			1	2
sugar maple	Acer saccharum	WDH	High	63.4	594.4	9.3	Lg. dec.	Lg. dec.	High	Abundant	Good	Good			1	3
yellow-poplar	Liriodendron tulipifera	WDH	High	37.8	392.7	10.6	Lg. dec.	Lg. dec.	High	Common	Fair	Fair			1	4
white oak	Quercus alba	WDH	Medium	40.2	338.8	9.0	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good			1	5
white ash	Fraxinus americana	WDL	Medium	54.9	337.0	7.1	No change	No change	Low	Common	Poor	Poor			0	6
winged elm	Ulmus alata	WDL	Medium	64.6	323.5	5.0	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	7
shagbark hickory	Carya ovata	WSL	Medium	54.9	292.0	6.2	Sm. dec.	Sm. dec.	Medium	Common	Poor	Poor			0	8
pignut hickory	Carya glabra	WDL	Medium	40.2	268.3	6.4	Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor			0	9
sassafras	Sassafras albidum	WSL	Low	36.6	265.8	7.1	Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor			0	10
chinkapin oak	Quercus muehlenbergii	NSL	Medium	52.4	252.3	4.9	Sm. dec.	Sm. dec.	Medium	Common	Poor	Poor			0	11
black walnut	Juglans nigra	WDH	Low	46.3	217.3	4.9	Sm. dec.	No change	Medium	Common	Poor	Fair			1	12
boxelder	Acer negundo	WSH	Low	24.4	214.0	12.2	No change	Sm. inc.	High	Common	Good	Very Good			1	13
American elm	Ulmus americana	WDH	Medium	48.8	201.5	4.3	Sm. inc.	Lg. inc.	Medium	Common	Good	Very Good			1	14
sugarberry	Celtis laevigata	NDH	Medium	31.7	184.3	5.7	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	15
scarlet oak	Quercus coccinea	WDL	Medium	30.5	171.2	5.7	Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor			0	16
black oak	Quercus velutina	WDH	High	37.8	168.9	4.8	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	17
black locust	Robinia pseudoacacia	NDH	Low	31.7	163.9	6.0	Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor			0	18
northern red oak	Quercus rubra	WDH	Medium	25.6	153.1	5.2	No change	No change	High	Common	Good	Good			1	19
post oak	Quercus stellata	WDH	High	30.5	140.5	6.7	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	20
blue ash	Fraxinus quadrangulata	NSL	Low	32.9	137.5	4.9	Sm. dec.	Sm. dec.	Low	Common	Poor	Poor			0	21
American beech	Fagus grandifolia	WDH	High	29.3	131.9	4.5	Sm. dec.	No change	Medium	Common	Poor	Fair			1	22
Osage-orange	Maclura pomifera	NDH	Medium	18.3	129.6	6.1	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	23
green ash	Fraxinus pennsylvanica	WSH	Low	31.7	123.0	3.9	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	24
blackgum	Nyssa sylvatica	WDL	Medium	32.9	111.2	3.9	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good			1	25
black cherry	Prunus serotina	WDL	Medium	20.7	103.5	5.5	Sm. inc.	Sm. inc.	Low	Common	Fair	Fair			1	26
mockernut hickory	Carya alba	WDL	Medium	31.7	102.9	4.0	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	27
ailanthus	Ailanthus altissima	NSL	FIA	13.4	100.2	6.5	Unknown	Unknown	NA	Common	NNIS	NNIS			0	28
slippery elm	Ulmus rubra	WSL	Low	39	98.8	3.3	Sm. inc.	Lg. inc.	Medium	Common	Good	Very Good			1	29
eastern hophornbeam; ironw	Ostrya virginiana	WSL	Low	43.9	81.6	2.0	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good			1	30
chestnut oak	Quercus prinus	NDH	High	14.6	79.6	6.4	No change	No change	High	Common	Good	Good	Infill ++	Infill ++	1	31
flowering dogwood	Cornus florida	WDL	Medium	29.3	78.5	2.7	No change	No change	Medium	Common	Fair	Fair			1	32
sycamore	Platanus occidentalis	NSL	Low	26.8	77.1	4.8	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	33
common persimmon	Diospyros virginiana	NSL	Low	32.9	72.3	2.6	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	34
sweetgum	Liquidambar styraciflua	WDH	High	25.6	70.3	6.5	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	35
sourwood	Oxydendrum arboreum	NDL	High	13.4	68.3	4.4	Lg. dec.	Lg. dec.	High	Common	Fair	Fair			1	36
honeylocust	Gleditsia triacanthos	NSH	Low	19.5	63.5	2.8	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	37
bitternut hickory	Carya cordiformis	WSL	Low	22	60.6	3.7	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good			1	38
red maple	Acer rubrum	WDH	High	18.3	41.9	3.9	Lg. inc.	Lg. inc.	High	Rare	Good	Good			1	39
silver maple	Acer saccharinum	NSH	Low	2.4	40.4	14.3	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor			0	40
southern red oak	Quercus falcata	WDL	Medium	14.6	38.5	3.6	Lg. inc.	Lg. inc.	High	Rare	Good	Good			1	41
red mulberry	Morus rubra	NSL	Low	29.3	37.0	1.9	Sm. dec.	No change	Medium	Rare	Very Poor	Poor			1	42
Shumard oak	Quercus shumardii	NSL	Low	6.1	34.9	5.0	No change	No change	High	Rare	Fair	Fair	Infill +	Infill +	1	43
eastern redbud	Cercis canadensis	NSL	Low	28	28.4	1.3	Sm. inc.	Sm. inc.	Medium	Rare	Fair	Fair			1	44
American hornbeam; musclev	Carpinus caroliniana	WSL	Low	15.9	22.5	2.2	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			1	45
loblolly pine	Pinus taeda	WDH	High	3.7	14.1	3.3	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	2	46
pawpaw	Asimina triloba	NSL	Low	2.4	7.2	2.6	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	47

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USDA Forest Service  
Northern Research Station  
Landscape Change Research Group  
Iverson, Peters, Prasad, Matthews

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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	1.2	5.6	4.0	Sm. inc.	Sm. inc.	Medium	Rare	Fair	Fair	Infill +	Infill +	2	48	
pecan	Carya illinoensis	NSH	Low	1.2	4.2	3.0	Lg. inc.	Lg. inc.	Low	Rare	Fair	Fair	Infill +	Infill +	2	49	
eastern cottonwood	Populus deltoides	NSH	Low	1.2	3.7	2.6	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	50	
white mulberry	Morus alba	NSL	FIA	2.4	3.3	1.2	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	51	
serviceberry	Amelanchier spp.	NSL	Low	2.4	3.1	1.1	Lg. dec.	Very Lg. dec.	Medium	Rare	Very Poor	Lost			0	52	
American chestnut	Castanea dentata	NSLX	FIA	1.2	3.0	2.1	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	53	
paulownia	Paulownia tomentosa	NSL	FIA	1.2	2.3	1.6	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	54	
yellow buckeye	Aesculus flava	NSL	Low	2.4	2.2	0.8	Very Lg. dec.	Very Lg. dec.	Low	Rare	Lost	Lost			0	55	
Kentucky coffeetree	Gymnocladus dioicus	NSLX	FIA	1.2	1.6	1.2	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	56	
American basswood	Tilia americana	WSL	Medium	1.2	1.2	0.8	Very Lg. dec.	Very Lg. dec.	Medium	Rare	Lost	Lost			0	57	
pin cherry	Prunus pensylvanica	NSL	Low	1.2	0.7	0.5	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	58	
cherrybark oak; swamp red o.	Quercus pagoda	NSL	Medium	4.9	0.7	2.0	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	59	
ashe juniper	Juniperus ashei	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat				0	60
shortleaf pine	Pinus echinata	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate ++	Migrate ++	3	61	
slash pine	Pinus elliotii	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat				3	62
florida maple	Acer barbatum	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat		Migrate +		3	63
striped maple	Acer pensylvanicum	NSL	Medium	0	0	0	Unknown	New Habitat	Medium	Absent	Unknown	New Habitat				3	64
Ohio buckeye	Aesculus glabra	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown				0	65
river birch	Betula nigra	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +		3	66
cittamwood/gum bumelia	Sideroxylon lanuginosum ssp.	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat		Migrate ++		3	67
shellbark hickory	Carya laciniosa	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Likely +	Likely +		3	68
black hickory	Carya texana	NDL	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate ++		3	69
black ash	Fraxinus nigra	WSH	Medium	0	0	0	Unknown	Unknown	Low	Absent	Unknown	Unknown				0	70
cucumbertree	Magnolia acuminata	NSL	Low	0	0	0	Unknown	Unknown	Medium	Modeled	Unknown	Unknown				0	71
bigleaf magnolia	Magnolia macrophylla	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown				0	72
blackjack oak	Quercus marilandica	NSL	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Likely +	Likely +		3	73
water oak	Quercus nigra	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate ++		3	74
willow oak	Quercus phellos	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate ++	Migrate ++		3	75
live oak	Quercus virginiana	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat				3	76
black willow	Salix nigra	NSH	Low	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat	Likely +	Likely +		3	77
cedar elm	Ulmus crassifolia	NDH	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat				3	78