

**One x One Degree**  
**Climate Change Atlas Tree Species**  
 Current and Potential Future Habitat, Capability, and Migration

	sq. km	sq. mi	FIA Plots
Area of Region	9,683.1	3,738.7	147

**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	11	20	Increase	21	26	Very Good	8	9	Likely	0	0
Hickory	7			Medium	24	38	No Change	11	8	Good	13	15	Infill	13	16
Maple	4	Abundant	3	Low	29	8	Decrease	18	16	Fair	10	10	Migrate	5	7
Oak	12	Common	20	FIA	2		New	10	10	Poor	8	7		<b>18</b>	<b>23</b>
Pine	0	Rare	29				Unknown	6	6	Very Poor	9	8			
Other	26	Absent	14					<b>66</b>	<b>66</b>	FIA Only	2	2			
	<b>52</b>		<b>66</b>							Unknown	4	4			
											<b>54</b>	<b>55</b>			

**Potential Changes in Climate Variables**

**Temperature (°F)**

	Scenario	2009	2039	2069	2099	
Annual Average	CCSM45	54.8	56.8	58.6	59.1	
	CCSM85	54.8	57.5	59.9	62.9	
	GFDL45	54.8	59.4	60.0	61.0	
	GFDL85	54.8	57.7	60.7	64.8	
	HAD45	54.8	57.4	60.5	62.0	
	HAD85	54.8	57.7	62.5	66.1	
Growing Season (May—Sep)	CCSM45	72.0	74.3	75.9	76.5	
	CCSM85	72.0	75.2	77.6	81.2	
	GFDL45	72.0	77.7	78.3	80.0	
	GFDL85	72.0	75.6	79.2	84.2	
	HAD45	72.0	74.8	77.3	79.0	
	HAD85	72.0	75.1	80.9	84.2	
Coldest Month (Average)	CCSM45	27.5	29.6	31.2	31.6	
	CCSM85	27.5	30.4	31.4	33.2	
	GFDL45	27.5	31.8	32.2	32.3	
	GFDL85	27.5	30.3	31.6	32.6	
	HAD45	27.5	28.9	31.7	31.7	
	HAD85	27.5	30.8	33.4	35.4	
Warmest Month (Average)	CCSM45	78.5	80.9	82.1	82.6	
	CCSM85	78.5	82.1	83.5	85.1	
	GFDL45	78.5	82.3	83.9	85.1	
	GFDL85	78.5	82.5	84.2	87.8	
	HAD45	78.5	81.4	83.2	84.0	
	HAD85	78.5	82.8	86.0	87.6	

**Precipitation (in)**

	Scenario	2009	2039	2069	2099	
Annual Total	CCSM45	43.4	41.2	44.8	43.5	
	CCSM85	43.4	42.8	44.2	43.8	
	GFDL45	43.4	47.3	47.9	47.5	
	GFDL85	43.4	47.3	53.5	52.6	
	HAD45	43.4	44.5	45.5	45.3	
	HAD85	43.4	45.4	42.3	45.8	
Growing Season (May—Sep)	CCSM45	23.3	21.8	23.7	22.4	
	CCSM85	23.3	22.8	22.8	22.0	
	GFDL45	23.3	25.7	24.1	24.6	
	GFDL85	23.3	25.5	27.7	26.6	
	HAD45	23.3	23.1	23.3	23.2	
	HAD85	23.3	23.6	20.2	21.1	

**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
post oak	Quercus stellata	WDH	High	54.5	975.7	17.5	No change	No change	High	Abundant	Very Good	Very Good			1	1
white oak	Quercus alba	WDH	Medium	44.7	712.2	14.8	Lg. dec.	Lg. dec.	High	Abundant	Good	Good			1	2
black oak	Quercus velutina	WDH	High	57.5	619.3	10.9	Sm. dec.	Sm. dec.	Medium	Abundant	Fair	Fair			0	3
eastern redcedar	Juniperus virginiana	WDH	Medium	61.4	333.8	7.4	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	4
shagbark hickory	Carya ovata	WSL	Medium	63.5	304.5	6.9	Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor			0	5
black walnut	Juglans nigra	WDH	Low	64.5	283.1	6.3	No change	No change	Medium	Common	Fair	Fair			1	6
northern red oak	Quercus rubra	WDH	Medium	50.7	278.7	6.8	Sm. dec.	Sm. dec.	High	Common	Fair	Fair			1	7
American elm	Ulmus americana	WDH	Medium	76.5	262.2	5.7	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	8
chinkapin oak	Quercus muehlenbergii	NSL	Medium	30.1	165.9	4.3	Sm. dec.	Sm. dec.	Medium	Common	Poor	Poor			0	9
honeylocust	Gleditsia triacanthos	NSH	Low	51.7	154.0	5.0	No change	Sm. inc.	High	Common	Good	Very Good			1	10
hackberry	Celtis occidentalis	WDH	Medium	61.8	148.4	6.6	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	11
Osage-orange	Maclura pomifera	NDH	Medium	49.8	142.3	8.2	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good			1	12
black hickory	Carya texana	NDL	High	30.1	119.1	3.2	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	13
mockernut hickory	Carya alba	WDL	Medium	28.8	104.8	3.1	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good			1	14
shingle oak	Quercus imbricaria	NDH	Medium	36	86.5	4.7	Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor			0	15
slippery elm	Ulmus rubra	WSL	Low	51.6	85.3	2.2	No change	Sm. inc.	Medium	Common	Fair	Good			1	16
bitternut hickory	Carya cordiformis	WSL	Low	51.4	83.9	3.3	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good			1	17
pin oak	Quercus palustris	NSH	Low	23.7	83.2	4.5	No change	Sm. dec.	Low	Common	Poor	Poor	Infill +	Infill +	0	18
white ash	Fraxinus americana	WDL	Medium	48.5	81.8	2.6	Lg. inc.	Lg. inc.	Low	Common	Good	Good			1	19
blackjack oak	Quercus marilandica	NSL	Medium	23.1	67.6	4.0	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good	Infill ++	Infill ++	1	20
red mulberry	Morus rubra	NSL	Low	58.6	61.6	2.3	No change	No change	Medium	Common	Fair	Fair			1	21
eastern redbud	Cercis canadensis	NSL	Low	23.9	56.1	1.8	Sm. dec.	No change	Medium	Common	Poor	Fair			1	22
Shumard oak	Quercus shumardii	NSL	Low	11	55.9	4.9	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good	Infill ++	Infill ++	1	23
green ash	Fraxinus pennsylvanica	WSH	Low	31.6	48.8	5.7	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			1	24
black cherry	Prunus serotina	WDL	Medium	41.3	44.6	1.9	Lg. inc.	Lg. inc.	Low	Rare	Fair	Fair			1	25
pecan	Carya illinoensis	NSH	Low	14.9	43.0	5.5	Lg. inc.	Lg. inc.	Low	Rare	Fair	Fair	Infill +	Infill +	2	26
silver maple	Acer saccharinum	NSH	Low	16.6	35.2	6.3	Sm. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	Infill ++	1	27
black locust	Robinia pseudoacacia	NDH	Low	14.5	34.9	9.9	Sm. dec.	Sm. inc.	Medium	Rare	Very Poor	Fair		Infill +	1	28
sycamore	Platanus occidentalis	NSL	Low	14.7	32.1	4.0	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	1	29
common persimmon	Diospyros virginiana	NSL	Low	24.7	29.0	1.7	Lg. inc.	Lg. inc.	High	Rare	Good	Good			1	30
sassafras	Sassafras albidum	WSL	Low	2.8	19.8	2.3	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			2	31
sugar maple	Acer saccharum	WDH	High	4.3	18.7	3.3	No change	Sm. inc.	High	Rare	Fair	Good	Infill +	Infill ++	2	32
flowering dogwood	Cornus florida	WDL	Medium	4.1	16.9	1.2	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	1	33
river birch	Betula nigra	NSL	Low	4.4	16.8	2.0	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	34
pignut hickory	Carya glabra	WDL	Medium	3.7	14.3	1.3	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	35
bur oak	Quercus macrocarpa	NDH	Medium	18.9	13.0	3.4	No change	Sm. inc.	High	Rare	Fair	Good	Infill +	Infill ++	2	36
eastern cottonwood	Populus deltoides	NSH	Low	17.5	11.2	4.1	Sm. dec.	No change	Medium	Rare	Very Poor	Poor		Infill +	1	37
boxelder	Acer negundo	WSH	Low	17.1	11.0	2.9	Lg. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	Infill ++	1	38
swamp white oak	Quercus bicolor	NSL	Low	6.7	10.6	2.4	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	39
eastern hophornbeam; ironw	Ostrya virginiana	WSL	Low	4.5	10.4	1.6	No change	No change	High	Rare	Fair	Fair		Infill +	2	40
scarlet oak	Quercus coccinea	WDL	Medium	1	9.7	9.4	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			2	41
wild plum	Prunus americana	NSLX	FIA	1.4	8.0	2.0	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	42
black willow	Salix nigra	NSH	Low	8.3	8.0	15.5	Sm. inc.	Lg. inc.	Low	Rare	Poor	Fair	Infill +	Infill +	1	43
serviceberry	Amelanchier spp.	NSL	Low	3.1	4.6	1.5	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	44
cittamwood/gum bumelia	Sideroxylon lanuginosum ssp.	NSL	Low	5.3	4.5	0.6	Lg. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	Infill ++	2	45
Kentucky coffeetree	Gymnocladus dioica	NSLX	FIA	4.2	4.4	2.1	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	46
blue ash	Fraxinus quadrangulata	NSL	Low	1.3	2.7	0.9	Very Lg. dec.	Sm. dec.	Low	Rare	Lost	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
sugarberry	Celtis laevigata	NDH	Medium	1	1.2	1.2	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	48
shellbark hickory	Carya laciniosa	NSL	Low	4.1	1.2	4.7	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	49
Ohio buckeye	Aesculus glabra	NSL	Low	9.2	1.2	1.1	Very Lg. dec.	Very Lg. dec.	Medium	Rare	Lost	Lost			0	50
red maple	Acer rubrum	WDH	High	4.1	0.5	1.8	Lg. inc.	Lg. inc.	High	Rare	Good	Good			2	51
pawpaw	Asimina triloba	NSL	Low	1.1	0.2	0.2	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	52
ashe juniper	Juniperus ashei	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			0	53
shortleaf pine	Pinus echinata	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate ++	Migrate ++	3	54
loblolly pine	Pinus taeda	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate ++	3	55
striped maple	Acer pensylvanicum	NSL	Medium	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	56
black ash	Fraxinus nigra	WSH	Medium	0	0	0	Unknown	Unknown	Low	Absent	Unknown	Unknown			0	57
sweetgum	Liquidambar styraciflua	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	58
bigleaf magnolia	Magnolia macrophylla	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	59
blackgum	Nyssa sylvatica	WDL	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate ++	Migrate +	3	60
pin cherry	Prunus pensylvanica	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	61
southern red oak	Quercus falcata	WDL	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +	Migrate ++	3	62
water oak	Quercus nigra	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +	3	63
live oak	Quercus virginiana	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	64
winged elm	Ulmus alata	WDL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate ++	Migrate ++	3	65
cedar elm	Ulmus crassifolia	NDH	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat			3	66