

**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	9,273.2	3,580.4	79

**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	4			High	10	21	Increase	19	20	Very Good	5	3	Likely	1	1
Hickory	4			Medium	26	32	No Change	10	8	Good	12	15	Infill	27	26
Maple	4	Abundant	0	Low	25	9	Decrease	18	19	Fair	9	10	Migrate	3	6
Oak	9	Common	19	FIA	5		New	11	11	Poor	9	6			
Pine	3	Rare	33				Unknown	8	8	Very Poor	12	12			
Other	28	Absent	13							FIA Only	1	1			
										Unknown	3	3			
	<b>52</b>		<b>65</b>		<b>66</b>	<b>62</b>		<b>66</b>	<b>66</b>		<b>51</b>	<b>50</b>		<b>31</b>	<b>33</b>

**Potential Changes in Climate Variables**

**Temperature (°F)**

	Scenario	2009	2039	2069	2099	
Annual Average	CCSM45	49.2	51.0	53.6	53.7	
	CCSM85	49.2	51.7	54.4	57.5	
	GFDL45	49.2	54.5	54.8	55.8	
	GFDL85	49.2	52.3	55.8	60.2	
	HAD45	49.2	52.3	55.8	57.4	
	HAD85	49.2	52.5	57.1	62.2	
Growing Season (May—Sep)	CCSM45	66.8	68.6	71.0	71.4	
	CCSM85	66.8	69.6	72.0	75.8	
	GFDL45	66.8	73.3	73.6	75.0	
	GFDL85	66.8	70.7	74.9	80.0	
	HAD45	66.8	70.3	73.1	75.4	
	HAD85	66.8	70.1	75.6	80.9	
Coldest Month Average	CCSM45	21.7	23.3	25.6	25.6	
	CCSM85	21.7	24.3	25.9	27.7	
	GFDL45	21.7	25.0	25.9	26.6	
	GFDL85	21.7	24.8	26.2	27.7	
	HAD45	21.7	23.4	26.8	26.7	
	HAD85	21.7	25.2	28.0	31.0	
Warmest Month Average	CCSM45	72.7	74.5	76.1	76.6	
	CCSM85	72.7	76.0	77.7	79.7	
	GFDL45	72.7	75.7	77.6	78.5	
	GFDL85	72.7	76.7	78.8	81.9	
	HAD45	72.7	76.6	78.8	80.2	
	HAD85	72.7	77.5	81.4	85.0	

**Precipitation (in)**

	Scenario	2009	2039	2069	2099	
Annual Total	CCSM45	36.2	36.0	35.8	36.8	
	CCSM85	36.2	36.7	36.6	37.9	
	GFDL45	36.2	38.7	42.8	43.7	
	GFDL85	36.2	38.5	43.6	45.4	
	HAD45	36.2	36.8	38.8	38.4	
	HAD85	36.2	38.7	36.2	39.1	
Growing Season (May—Sep)	CCSM45	18.1	18.1	17.6	17.4	
	CCSM85	18.1	17.3	17.4	16.8	
	GFDL45	18.1	18.9	20.2	21.0	
	GFDL85	18.1	19.2	20.3	20.4	
	HAD45	18.1	18.2	17.0	17.8	
	HAD85	18.1	17.9	14.7	15.6	

**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
American elm	Ulmus americana	WDH	Medium	69.7	322.0	9.7	No change	No change	Medium	Common	Fair	Fair	Infill +	Infill +	1	1
shagbark hickory	Carya ovata	WSL	Medium	50.9	306.9	11.3	Sm. dec.	Lg. dec.	Medium	Common	Poor	Poor	Infill +	Infill +	0	2
American basswood	Tilia americana	WSL	Medium	48.3	302.8	13.1	Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor	Infill +	Infill +	0	3
black cherry	Prunus serotina	WDL	Medium	28.6	266.0	11.1	No change	Sm. dec.	Low	Common	Poor	Poor	Infill +	Infill +	0	4
red maple	Acer rubrum	WDH	High	42.7	261.4	10.6	Sm. dec.	Sm. dec.	High	Common	Fair	Fair	Infill +	Infill +	1	5
green ash	Fraxinus pennsylvanica	WSH	Low	41.6	258.4	11.3	No change	No change	Medium	Common	Fair	Fair	Infill +	Infill +	1	6
sugar maple	Acer saccharum	WDH	High	51.5	237.1	8.5	No change	Sm. dec.	High	Common	Good	Fair	Infill ++	Infill +	1	7
black walnut	Juglans nigra	WDH	Low	32.4	180.6	6.7	No change	No change	Medium	Common	Fair	Fair	Infill +	Infill +	1	8
eastern white pine	Pinus strobus	WDH	High	9.2	157.0	22.7	Lg. dec.	Lg. dec.	Low	Common	Very Poor	Very Poor			0	9
white ash	Fraxinus americana	WDL	Medium	49.9	140.0	7.3	Sm. inc.	Sm. inc.	Low	Common	Fair	Fair	Infill +	Infill +	1	10
white oak	Quercus alba	WDH	Medium	32.2	135.6	8.3	Sm. inc.	No change	High	Common	Very Good	Good	Infill ++	Infill ++	1	11
northern red oak	Quercus rubra	WDH	Medium	43	113.8	6.4	Sm. inc.	No change	High	Common	Very Good	Good	Infill ++	Infill ++	1	12
black oak	Quercus velutina	WDH	High	24.9	104.1	10.9	Sm. inc.	Sm. inc.	Medium	Common	Good	Good	Infill ++	Infill ++	1	13
silver maple	Acer saccharinum	NSH	Low	14.3	86.2	7.6	Lg. inc.	Sm. inc.	High	Common	Very Good	Very Good	Infill ++	Infill ++	1	14
boxelder	Acer negundo	WSH	Low	13.1	61.8	4.7	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good	Infill ++	Infill ++	1	15
bitternut hickory	Carya cordiformis	WSL	Low	25.4	59.7	5.7	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good	Infill ++	Infill ++	1	16
scarlet oak	Quercus coccinea	WDL	Medium	7.1	59.0	27.1	Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor			0	17
Scots pine	Pinus sylvestris	NSH	FIA	1.1	53.5	49.6	Unknown	Unknown	NA	Common	NNIS	NNIS			0	18
swamp white oak	Quercus bicolor	NSL	Low	9.8	50.5	5.5	No change	No change	Medium	Common	Fair	Fair	Infill +	Infill +	2	19
hackberry	Celtis occidentalis	WDH	Medium	19.7	46.7	4.5	Lg. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	Infill ++	2	20
eastern hophornbeam; ironw	Ostrya virginiana	WSL	Low	29.6	45.1	3.2	Sm. dec.	Lg. dec.	High	Rare	Poor	Poor	Infill +	Infill +	1	21
bur oak	Quercus macrocarpa	NDH	Medium	18.7	44.2	7.0	Sm. inc.	Sm. inc.	High	Rare	Good	Good			2	22
slippery elm	Ulmus rubra	WSL	Low	27.1	42.8	3.9	No change	Sm. inc.	Medium	Rare	Poor	Fair	Infill +	Infill +	1	23
Norway spruce	Picea abies	NSH	FIA	1.1	33.1	30.7	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	24
white mulberry	Morus alba	NSL	FIA	4.4	28.7	3.9	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	25
eastern cottonwood	Populus deltoides	NSH	Low	11.1	28.6	4.2	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	2	26
American beech	Fagus grandifolia	WDH	High	20.7	27.8	6.5	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			2	27
bigtooth aspen	Populus grandidentata	NSL	Medium	6.1	25.1	5.7	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	28
pignut hickory	Carya glabra	WDL	Medium	15.1	21.1	3.8	Lg. inc.	Sm. inc.	Medium	Rare	Good	Fair	Infill ++	Infill +	2	29
pin oak	Quercus palustris	NSH	Low	16.6	20.5	5.1	Lg. inc.	Lg. inc.	Low	Rare	Fair	Fair	Infill +	Infill +	2	30
honeylocust	Gleditsia triacanthos	NSH	Low	10.8	15.4	9.5	Lg. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	Infill ++	2	31
Ohio buckeye	Aesculus glabra	NSL	Low	27.7	14.8	3.9	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	32
yellow birch	Betula alleghaniensis	NDL	High	0.7	13.7	7.8	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	33
blue ash	Fraxinus quadrangulata	NSL	Low	5.4	12.4	6.2	Sm. dec.	Sm. dec.	Low	Rare	Very Poor	Very Poor			0	34
quaking aspen	Populus tremuloides	WDH	High	3.3	12.0	2.2	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	35
sassafras	Sassafras albidum	WSL	Low	16.3	10.9	2.9	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++		1	36
black locust	Robinia pseudoacacia	NDH	Low	5.8	9.8	5.3	Sm. inc.	Lg. inc.	Medium	Rare	Fair	Good	Infill +	Infill ++	2	37
black ash	Fraxinus nigra	WSH	Medium	7.8	9.6	1.7	Lg. dec.	Lg. dec.	Low	Rare	Very Poor	Very Poor			0	38
winged elm	Ulmus alata	WDL	Medium	1.1	9.5	8.8	No change	Lg. inc.	Medium	Rare	Poor	Good			2	39
black willow	Salix nigra	NSH	Low	2.8	8.8	2.2	Sm. dec.	No change	Low	Rare	Very Poor	Very Poor			2	40
sycamore	Platanus occidentalis	NSL	Low	4.9	8.7	6.3	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	41
yellow-poplar	Liriodendron tulipifera	WDH	High	13.5	8.2	5.9	Lg. inc.	Lg. inc.	High	Rare	Good	Good		Infill ++	1	42
American hornbeam; muscle	Carpinus caroliniana	WSL	Low	10.6	7.2	1.0	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	43
Osage-orange	Maclura pomifera	NDH	Medium	9.2	6.1	3.8	Sm. inc.	Lg. inc.	High	Rare	Good	Good			2	44
chokecherry	Prunus virginiana	NSLX	FIA	2.2	5.9	2.8	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	45
northern pin oak	Quercus ellipsoidalis	NSH	Medium	1.1	5.4	5.0	Lg. dec.	Very Lg. dec.	High	Rare	Poor	Lost			0	46
red pine	Pinus resinosa	NSH	Medium	5.7	3.8	4.4	Lg. dec.	Lg. dec.	Low	Rare	Very Poor	Very Poor			0	47

One x One Degree  
Climate Change Atlas Tree Species

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Common Name	Scientific Name	Range	MR	%Cell	FIAsum	FIAiv	ChngCl45	ChngCl85	Adap	Abund	Capabil45	Capabil85	SHIFT45	SHIFT85	SSO	N
ailanthus	Ailanthus altissima	NSL	FIA	0.7	3.3	2.1	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	48
flowering dogwood	Cornus florida	WDL	Medium	4.7	3.3	1.2	Sm. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			2	49
mockernut hickory	Carya alba	WDL	Medium	5.4	2.7	2.2	No change	Sm. inc.	High	Rare	Fair	Good	Infill +		2	50
eastern redcedar	Juniperus virginiana	WDH	Medium	1.1	2.5	2.4	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	51
chinkapin oak	Quercus muehlenbergii	NSL	Medium	4.6	2.4	1.3	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	52
jack pine	Pinus banksiana	NSH	Medium	0	0	0	Unknown	Unknown	High	Absent	Unknown	Unknown			0	53
pecan	Carya illinoensis	NSH	Low	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat			3	54
black hickory	Carya texana	NDL	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	55
sugarberry	Celtis laevigata	NDH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	56
eastern redbud	Cercis canadensis	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	57
common persimmon	Diospyros virginiana	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat		Migrate +	3	58
red mulberry	Morus rubra	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Likely +	Likely +	3	59
blackgum	Nyssa sylvatica	WDL	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat		Migrate +	3	60
pin cherry	Prunus pensylvanica	NSL	Low	0	0	0	Unknown	Unknown	Medium	Modeled	Unknown	Unknown			0	61
shingle oak	Quercus imbricaria	NDH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	62
blackjack oak	Quercus marilandica	NSL	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			3	63
Shumard oak	Quercus shumardii	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat		Migrate +	3	64
post oak	Quercus stellata	WDH	High	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate ++	Migrate ++	3	65
bluejack oak	Quercus incana	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	66