

**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	7,972.8	3,078.3	43

**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	20	Increase	12	10	Very Good	0	0	Likely	1	1
Hickory	4			Medium	25	32	No Change	14	12	Good	10	8	Infill	25	25
Maple	4	Abundant	0	Low	27	11	Decrease	17	21	Fair	10	10	Migrate	4	5
Oak	9	Common	10	FIA	4		New	15	15	Poor	12	13			
Pine	3	Rare	37				Unknown	8	8	Very Poor	11	12			
Other	23	Absent	16							FIA Only	1	1			
	<b>47</b>		<b>63</b>		<b>66</b>	<b>63</b>		<b>66</b>	<b>66</b>	Unknown	4	4			
											<b>48</b>	<b>48</b>			

**Potential Changes in Climate Variables**

**Temperature (°F)**

	Scenario	2009	2039	2069	2099	
Annual Average	CCSM45	50.0	51.8	54.4	54.5	
	CCSM85	50.0	52.4	55.1	58.3	
	GFDL45	50.0	56.2	55.7	56.7	
	GFDL85	50.0	53.1	56.7	61.1	
	HAD45	50.0	53.1	56.6	58.3	
	HAD85	50.0	53.3	57.9	62.9	
Growing Season May—Sep	CCSM45	67.5	69.3	71.6	72.1	
	CCSM85	67.5	70.1	72.5	76.4	
	GFDL45	67.5	75.2	74.4	75.8	
	GFDL85	67.5	71.4	75.6	80.7	
	HAD45	67.5	71.0	73.8	76.1	
	HAD85	67.5	70.8	76.3	81.6	
Coldest Month Average	CCSM45	22.9	24.5	26.6	26.7	
	CCSM85	22.9	25.5	27.0	28.9	
	GFDL45	22.9	26.1	27.0	27.7	
	GFDL85	22.9	26.0	27.3	28.9	
	HAD45	22.9	24.4	27.9	27.9	
	HAD85	22.9	26.1	28.9	31.8	
Warmest Month Average	CCSM45	73.5	75.3	76.9	77.3	
	CCSM85	73.5	76.6	78.3	80.4	
	GFDL45	73.5	76.5	78.5	79.3	
	GFDL85	73.5	77.4	79.5	82.6	
	HAD45	73.5	77.3	79.5	81.0	
	HAD85	73.5	78.2	82.1	85.8	

**Precipitation (in)**

	Scenario	2009	2039	2069	2099	
Annual Total	CCSM45	35.2	35.7	35.4	36.8	
	CCSM85	35.2	36.4	36.5	37.6	
	GFDL45	35.2	38.1	41.8	42.8	
	GFDL85	35.2	37.4	42.4	44.2	
	HAD45	35.2	35.8	37.2	37.3	
	HAD85	35.2	37.6	34.9	38.0	
Growing Season May—Sep	CCSM45	17.3	17.5	16.8	17.0	
	CCSM85	17.3	16.7	16.9	16.3	
	GFDL45	17.3	18.5	19.5	20.2	
	GFDL85	17.3	18.3	19.3	19.5	
	HAD45	17.3	17.5	16.1	16.9	
	HAD85	17.3	17.2	13.9	14.9	

**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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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	47.3	178.8	12.0	Lg. dec.	Lg. dec.	High	Common	Fair	Fair	Infill +	Infill +	2	1
American basswood	Tilia americana	WSL	Medium	45.4	170.4	12.3	Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor	Infill +	Infill +	2	2
black cherry	Prunus serotina	WDL	Medium	41.4	113.5	8.3	Sm. dec.	Lg. dec.	Low	Common	Poor	Very Poor	Infill +		2	3
shagbark hickory	Carya ovata	WSL	Medium	33.9	108.6	8.9	Sm. dec.	Lg. dec.	Medium	Common	Poor	Poor	Infill +	Infill +	2	4
sugar maple	Acer saccharum	WDH	High	29.3	106.4	8.3	No change	Sm. dec.	High	Common	Good	Fair	Infill ++	Infill +	2	5
American elm	Ulmus americana	WDH	Medium	65.8	92.7	5.5	Sm. inc.	Sm. inc.	Medium	Common	Good	Good	Infill ++	Infill ++	2	6
eastern cottonwood	Populus deltoides	NSH	Low	15.4	84.5	11.7	No change	No change	Medium	Common	Fair	Fair	Infill +	Infill +	2	7
white ash	Fraxinus americana	WDL	Medium	59.9	77.4	9.3	No change	No change	Low	Common	Poor	Poor	Infill +	Infill +	2	8
green ash	Fraxinus pennsylvanica	WSH	Low	52.8	75.6	11.4	Sm. inc.	Sm. inc.	Medium	Common	Good	Good	Infill ++	Infill ++	2	9
northern red oak	Quercus rubra	WDH	Medium	38.5	60.7	4.3	No change	Sm. dec.	High	Common	Good	Fair	Infill ++	Infill +	2	10
bitternut hickory	Carya cordiformis	WSL	Low	39.1	44.6	4.3	No change	Sm. dec.	High	Rare	Fair	Poor	Infill +	Infill +	2	11
eastern hophornbeam; ironw	Ostrya virginiana	WSL	Low	31.6	43.2	2.8	Lg. dec.	Lg. dec.	High	Rare	Poor	Poor	Infill +	Infill +	2	12
silver maple	Acer saccharinum	NSH	Low	13.2	42.3	6.6	Lg. inc.	Lg. inc.	High	Rare	Good	Good			2	13
bur oak	Quercus macrocarpa	NDH	Medium	29.2	42.1	13.0	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor	Infill +	Infill +	2	14
hackberry	Celtis occidentalis	WDH	Medium	33.7	40.3	10.6	Sm. inc.	Sm. inc.	High	Rare	Good	Good	Infill ++	Infill ++	2	15
slippery elm	Ulmus rubra	WSL	Low	35.4	37.9	5.1	Sm. dec.	No change	Medium	Rare	Very Poor	Poor			2	16
black walnut	Juglans nigra	WDH	Low	43.2	33.9	5.6	Sm. inc.	Lg. inc.	Medium	Rare	Fair	Good	Infill +	Infill ++	2	17
white oak	Quercus alba	WDH	Medium	19.3	30.2	5.6	Lg. inc.	No change	High	Rare	Good	Fair		Infill +	2	18
pignut hickory	Carya glabra	WDL	Medium	7.9	30.0	8.0	Sm. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			2	19
swamp white oak	Quercus bicolor	NSL	Low	7	29.3	8.4	No change	Sm. dec.	Medium	Rare	Poor	Very Poor	Infill +		2	20
white mulberry	Morus alba	NSL	FIA	18.9	16.7	6.0	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	21
boxelder	Acer negundo	WSH	Low	9.7	12.5	6.3	No change	No change	High	Rare	Fair	Fair	Infill +	Infill +	2	22
honeylocust	Gleditsia triacanthos	NSH	Low	9.6	11.0	7.5	No change	No change	High	Rare	Fair	Fair	Infill +	Infill +	2	23
pin oak	Quercus palustris	NSH	Low	14.6	9.2	5.2	Lg. inc.	Lg. inc.	Low	Rare	Fair	Fair	Infill +	Infill +	2	24
sycamore	Platanus occidentalis	NSL	Low	18.9	8.8	6.6	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	25
Scots pine	Pinus sylvestris	NSH	FIA	6.3	8.7	9.5	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	26
northern pin oak	Quercus ellipsoidalis	NSH	Medium	1.3	8.5	6.8	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor			0	27
sassafras	Sassafras albidum	WSL	Low	12.6	6.9	3.3	Sm. inc.	Lg. dec.	Medium	Rare	Fair	Very Poor	Infill +		2	28
mockernut hickory	Carya alba	WDL	Medium	5.6	6.4	5.6	No change	No change	High	Rare	Fair	Fair	Infill +	Infill +	2	29
black ash	Fraxinus nigra	WSH	Medium	7.2	6.2	8.9	Lg. dec.	Lg. dec.	Low	Rare	Very Poor	Very Poor			0	30
flowering dogwood	Cornus florida	WDL	Medium	11.3	4.6	1.9	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	31
American hornbeam; musclev	Carpinus caroliniana	WSL	Low	8.6	3.8	1.0	Sm. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	32
eastern redcedar	Juniperus virginiana	WDH	Medium	0.6	3.6	1.4	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	33
butternut	Juglans cinerea	NSLX	FIA	1.3	3.3	2.6	Unknown	Unknown	Low	Rare	FIA Only	FIA Only			0	34
Norway spruce	Picea abies	NSH	FIA	5	3.0	9.6	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	35
eastern redbud	Cercis canadensis	NSL	Low	8.8	2.7	3.5	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	36
red pine	Pinus resinosa	NSH	Medium	3.4	2.5	5.4	Lg. dec.	Lg. dec.	Low	Rare	Very Poor	Very Poor			0	37
chinkapin oak	Quercus muehlenbergii	NSL	Medium	9.2	2.4	3.5	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	38
black willow	Salix nigra	NSH	Low	3.5	2.4	5.4	No change	Lg. inc.	Low	Rare	Very Poor	Fair		Infill +	2	39
blue ash	Fraxinus quadrangulata	NSL	Low	5	2.2	6.9	Sm. dec.	Sm. dec.	Low	Rare	Very Poor	Very Poor			0	40
red mulberry	Morus rubra	NSL	Low	5	2.1	6.8	No change	No change	Medium	Rare	Poor	Poor		Infill +	2	41
scarlet oak	Quercus coccinea	WDL	Medium	12	1.7	1.4	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	42
Ohio buckeye	Aesculus glabra	NSL	Low	5	1.4	4.4	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	43
black oak	Quercus velutina	WDH	High	6.9	1.4	1.5	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	44
quaking aspen	Populus tremuloides	WDH	High	12	0.9	0.8	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	45
American beech	Fagus grandifolia	WDH	High	8.5	0.5	0.7	Sm. inc.	No change	Medium	Rare	Fair	Poor	Infill +		2	46
eastern white pine	Pinus strobus	WDH	High	3.4	0.4	0.9	Lg. dec.	Lg. dec.	Low	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
serviceberry	Amelanchier spp.	NSL	Low	0	0	0	Unknown	Unknown	Medium	Modeled	Unknown	Unknown			0	48
pawpaw	Asimina triloba	NSL	Low	0	0	0	Unknown	Unknown	Medium	Modeled	Unknown	Unknown			0	49
pecan	Carya illinoensis	NSH	Low	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat			3	50
black hickory	Carya texana	NDL	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	51
sugarberry	Celtis laevigata	NDH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	52
common persimmon	Diospyros virginiana	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			3	53
sweetgum	Liquidambar styraciflua	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +		3	54
yellow-poplar	Liriodendron tulipifera	WDH	High	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			3	55
Osage-orange	Maclura pomifera	NDH	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +	Migrate ++	3	56
blackgum	Nyssa sylvatica	WDL	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			3	57
pin cherry	Prunus pensylvanica	NSL	Low	0	0	0	Unknown	Unknown	Medium	Modeled	Unknown	Unknown			0	58
shingle oak	Quercus imbricaria	NDH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	59
blackjack oak	Quercus marilandica	NSL	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			3	60
Shumard oak	Quercus shumardii	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat		Migrate +	3	61
post oak	Quercus stellata	WDH	High	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate ++	Migrate ++	3	62
bluejack oak	Quercus incana	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	63
black locust	Robinia pseudoacacia	NDH	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Likely +	Likely +	3	64
winged elm	Ulmus alata	WDL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate ++	3	65
cedar elm	Ulmus crassifolia	NDH	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat			0	66