

**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	9,941.4	3,838.4	310

**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	2			High	15	24	Increase	37	40	Very Good	15	15
Hickory	7			Medium	31	47	No Change	10	9	Good	23	25
Maple	4	Abundant	8	Low	32	10	Decrease	12	10	Fair	8	7
Oak	15	Common	18	FIA	4		New	15	15	Poor	6	6
Pine	2	Rare	37				Unknown	8	8	Very Poor	5	4
Other	33	Absent	16							FIA Only	3	3
	<b>63</b>		<b>79</b>		<b>82</b>	<b>81</b>		<b>82</b>	<b>82</b>	Unknown	4	4
											<b>64</b>	<b>64</b>

**Potential Changes in Climate Variables**

**Temperature (°F)**

	Scenario	2009	2039	2069	2099	
Annual Average	CCSM45	57.5	59.4	61.4	61.8	
	CCSM85	57.5	59.8	62.3	65.2	
	GFDL45	57.5	60.4	62.6	63.6	
	GFDL85	57.5	60.4	63.4	67.1	
	HAD45	57.5	60.2	63.2	64.6	
HAD85	57.5	60.5	65.1	68.9		
Growing Season (May—Sep)	CCSM45	73.3	75.2	76.8	77.5	
	CCSM85	73.3	75.7	78.2	81.9	
	GFDL45	73.3	76.5	79.3	81.0	
	GFDL85	73.3	77.0	80.4	85.1	
	HAD45	73.3	76.4	79.2	80.8	
HAD85	73.3	76.8	82.9	86.4		
Coldest Month (Average)	CCSM45	33.1	35.3	36.7	37.0	
	CCSM85	33.1	35.9	37.0	38.6	
	GFDL45	33.1	37.4	37.5	37.8	
	GFDL85	33.1	35.0	36.3	37.0	
	HAD45	33.1	34.3	36.5	36.6	
HAD85	33.1	35.7	37.7	39.5		
Warmest Month (Average)	CCSM45	79.4	81.5	82.5	82.8	
	CCSM85	79.4	82.0	83.2	85.1	
	GFDL45	79.4	83.8	84.9	86.1	
	GFDL85	79.4	83.6	85.3	88.3	
	HAD45	79.4	83.2	85.1	85.7	
HAD85	79.4	84.5	88.1	89.5		

**Precipitation (in)**

	Scenario	2009	2039	2069	2099	
Annual Total	CCSM45	46.9	46.1	51.4	48.9	
	CCSM85	46.9	48.8	50.3	51.1	
	GFDL45	46.9	52.4	54.9	54.2	
	GFDL85	46.9	52.2	58.3	58.7	
	HAD45	46.9	45.4	50.3	50.6	
HAD85	46.9	50.0	45.5	48.5		
Growing Season (May—Sep)	CCSM45	18.7	17.6	19.2	18.0	
	CCSM85	18.7	18.7	17.4	17.8	
	GFDL45	18.7	20.9	20.3	21.2	
	GFDL85	18.7	21.0	22.5	22.5	
	HAD45	18.7	17.4	17.7	17.1	
HAD85	18.7	18.5	14.5	14.4		

**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
black oak	Quercus velutina	WDH	High	81.6	1591.1	14.5	Sm. dec.	Sm. dec.	Medium	Abundant	Fair	Fair			0	1
post oak	Quercus stellata	WDH	High	87.8	1569.1	13.5	Sm. inc.	Sm. inc.	High	Abundant	Very Good	Very Good			1	2
white oak	Quercus alba	WDH	Medium	79.1	1386.0	12.8	Sm. dec.	Sm. dec.	High	Abundant	Good	Good			1	3
eastern redcedar	Juniperus virginiana	WDH	Medium	61.9	723.6	8.7	Sm. inc.	Sm. inc.	Medium	Abundant	Very Good	Very Good			1	4
black hickory	Carya texana	NDL	High	77.6	683.2	7.0	No change	No change	Medium	Abundant	Good	Good			1	5
southern red oak	Quercus falcata	WDL	Medium	54.5	660.3	9.8	Sm. inc.	Sm. inc.	High	Abundant	Very Good	Very Good			1	6
blackjack oak	Quercus marilandica	NSL	Medium	53.9	586.8	8.6	No change	Sm. inc.	High	Abundant	Very Good	Very Good			1	7
shortleaf pine	Pinus echinata	WDH	High	26.7	540.7	12.0	Sm. inc.	Lg. inc.	Medium	Abundant	Very Good	Very Good			1	8
scarlet oak	Quercus coccinea	WDL	Medium	25.4	435.0	11.7	Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor			0	9
mockernut hickory	Carya alba	WDL	Medium	65.1	355.3	4.2	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good			1	10
blackgum	Nyssa sylvatica	WDL	Medium	48.5	201.4	2.8	Sm. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	11
black walnut	Juglans nigra	WDH	Low	28.6	175.4	4.9	No change	No change	Medium	Common	Fair	Fair			1	12
winged elm	Ulmus alata	WDL	Medium	45.7	168.6	2.6	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	13
common persimmon	Diospyros virginiana	NSL	Low	33.7	168.4	4.0	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	14
northern red oak	Quercus rubra	WDH	Medium	33.3	167.5	3.3	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good			1	15
flowering dogwood	Cornus florida	WDL	Medium	58.3	140.0	1.8	No change	No change	Medium	Common	Fair	Fair			1	16
black cherry	Prunus serotina	WDL	Medium	48.4	118.4	1.9	Lg. inc.	Lg. inc.	Low	Common	Good	Good			1	17
sassafras	Sassafras albidum	WSL	Low	45.5	103.3	1.8	No change	Sm. inc.	Medium	Common	Fair	Good			1	18
honeylocust	Gleditsia triacanthos	NSH	Low	13.4	96.6	5.0	Sm. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	19
American elm	Ulmus americana	WDH	Medium	24.5	95.6	2.2	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	20
white ash	Fraxinus americana	WDL	Medium	35	90.3	1.9	Lg. inc.	Lg. inc.	Low	Common	Good	Good			1	21
chinkapin oak	Quercus muehlenbergii	NSL	Medium	24.9	88.5	2.9	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	22
pignut hickory	Carya glabra	WDL	Medium	17.6	80.6	2.8	Sm. dec.	No change	Medium	Common	Poor	Fair			1	23
sycamore	Platanus occidentalis	NSL	Low	11.8	61.6	2.9	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	24
sweetgum	Liquidambar styraciflua	WDH	High	9.4	57.9	4.0	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good	Infill ++	Infill ++	1	25
hackberry	Celtis occidentalis	WDH	Medium	18.1	52.0	2.1	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	26
bitternut hickory	Carya cordiformis	WSL	Low	13.1	49.1	3.2	Lg. inc.	Lg. inc.	High	Rare	Good	Good			1	27
slippery elm	Ulmus rubra	WSL	Low	18.6	45.8	2.2	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			1	28
red mulberry	Morus rubra	NSL	Low	18.8	45.0	2.1	Sm. dec.	No change	Medium	Rare	Very Poor	Poor			1	29
water oak	Quercus nigra	WDH	High	2.2	35.4	3.9	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	2	30
loblolly pine	Pinus taeda	WDH	High	2	34.6	10.7	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	2	31
wild plum	Prunus americana	NSLX	FIA	7.9	31.1	2.5	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	32
eastern redbud	Cercis canadensis	NSL	Low	16.8	29.8	1.4	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			1	33
sugarberry	Celtis laevigata	NDH	Medium	5.6	27.3	1.5	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	2	34
red maple	Acer rubrum	WDH	High	15.2	27.0	1.1	Lg. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	Infill ++	1	35
cherrybark oak; swamp red o	Quercus pagoda	NSL	Medium	5.7	25.2	4.1	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	1	36
green ash	Fraxinus pennsylvanica	WSH	Low	8.6	22.9	2.5	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			1	37
nuttall oak	Quercus texana	NSH	Medium	0.3	21.5	7.1	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor			0	38
shagbark hickory	Carya ovata	WSL	Medium	9.3	21.4	2.1	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	1	39
ashe juniper	Juniperus ashei	NDH	High	1	18.6	18.5	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			0	40
Shumard oak	Quercus shumardii	NSL	Low	5	14.7	2.3	No change	Sm. inc.	High	Rare	Fair	Good	Infill +	Infill ++	2	41
boxelder	Acer negundo	WSH	Low	6.1	13.9	1.8	Sm. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	Infill ++	1	42
florida maple	Acer barbatum	NSL	Low	1.2	12.0	4.6	No change	No change	High	Rare	Fair	Fair	Infill +	Infill +	2	43
willow oak	Quercus phellos	NSL	Low	2.3	9.2	2.4	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	44
eastern hophornbeam; ironw	Ostrya virginiana	WSL	Low	6	7.6	1.3	Lg. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	Infill ++	1	45
pecan	Carya illinoensis	NSH	Low	1	4.7	4.7	Lg. inc.	Lg. inc.	Low	Rare	Fair	Fair	Infill +	Infill +	2	46
Osage-orange	Maclura pomifera	NDH	Medium	1	3.8	3.8	Sm. inc.	Lg. inc.	High	Rare	Good	Good			2	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
river birch	Betula nigra	NSL	Low	2.4	3.6	1.1	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	2	48
sugar maple	Acer saccharum	WDH	High	2	3.5	1.7	Sm. inc.	Lg. inc.	High	Rare	Good	Good			2	49
American basswood	Tilia americana	WSL	Medium	2	3.2	1.6	Sm. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	50
American hornbeam; muscle	Carpinus caroliniana	WSL	Low	3.8	3.2	0.8	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	1	51
ailanthus	Ailanthus altissima	NSL	FIA	0.2	2.5	0.5	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	52
black locust	Robinia pseudoacacia	NDH	Low	2	2.5	1.2	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++		2	53
swamp chestnut oak	Quercus michauxii	NSL	Low	0.5	2.0	1.1	No change	No change	Medium	Rare	Poor	Poor		Infill +	2	54
cittamwood/gum bumelia	Sideroxylon lanuginosum ssp.	NSL	Low	1.2	1.6	0.3	Lg. inc.	Lg. inc.	High	Rare	Good	Good			2	55
Ohio buckeye	Aesculus glabra	NSL	Low	1	1.3	1.3	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	56
serviceberry	Amelanchier spp.	NSL	Low	1.2	0.9	0.2	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	57
shingle oak	Quercus imbricaria	NDH	Medium	1	0.9	0.9	Very Lg. dec.	Very Lg. dec.	Medium	Rare	Lost	Lost			0	58
pawpaw	Asimina triloba	NSL	Low	3	0.8	0.3	Very Lg. dec.	Very Lg. dec.	Medium	Rare	Lost	Lost			0	59
waterlocust	Gleditsia aquatica	NSLX	FIA	0.5	0.7	0.3	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	60
shellbark hickory	Carya laciniosa	NSL	Low	0.2	0.6	0.2	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	61
black willow	Salix nigra	NSH	Low	0.7	0.6	0.4	Lg. inc.	Lg. inc.	Low	Rare	Fair	Fair	Infill +	Infill +	2	62
butternut	Juglans cinerea	NSLX	FIA	1	0.5	0.5	Unknown	Unknown	Low	Rare	FIA Only	FIA Only			0	63
longleaf pine	Pinus palustris	NSH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	64
bald cypress	Taxodium distichum	NSH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	65
water hickory	Carya aquatica	NSL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Likely +	Likely +	3	66
American beech	Fagus grandifolia	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	67
black ash	Fraxinus nigra	WSH	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat			3	68
blue ash	Fraxinus quadrangulata	NSL	Low	0	0	0	Unknown	Unknown	Low	Modeled	Unknown	Unknown			0	69
American holly	Ilex opaca	NSL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate ++	3	70
yellow-poplar	Liriodendron tulipifera	WDH	High	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat		Migrate +	3	71
bigleaf magnolia	Magnolia macrophylla	NSL	Low	0	0	0	Unknown	Unknown	Medium	Modeled	Unknown	Unknown			0	72
sourwood	Oxydendrum arboreum	NDL	High	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat		Migrate +	3	73
water elm	Planera aquatica	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Likely +	Likely +	3	74
pin cherry	Prunus pensylvanica	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	75
overcup oak	Quercus lyrata	NSL	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat	Likely +	Likely +	3	76
bur oak	Quercus macrocarpa	NDH	Medium	0	0	0	Unknown	Unknown	High	Modeled	Unknown	Unknown			0	77
pin oak	Quercus palustris	NSH	Low	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat			3	78
chestnut oak	Quercus prinus	NDH	High	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat		Migrate +	3	79
live oak	Quercus virginiana	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	80
bluejack oak	Quercus incana	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +	3	81
cedar elm	Ulmus crassifolia	NDH	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat	Migrate ++	Migrate ++	3	82