

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

Area of Region      sq. km      sq. mi      FIA Plots  
 9,412.7      3,634.3      199

**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	19	23	Increase	18	16	Very Good	9	8	Likely	1	1
Hickory	4			Medium	26	45	No Change	6	12	Good	11	13	Infill	8	9
Maple	7	Abundant	5	Low	31	11	Decrease	29	25	Fair	6	6	Migrate	10	12
Oak	9	Common	23	FIA	8		New	18	18	Poor	10	9		19	22
Pine	3	Rare	33				Unknown	13	13	Very Poor	16	13			
Other	35	Absent	21							FIA Only	3	3			
	<b>61</b>		<b>82</b>		<b>84</b>	<b>79</b>		<b>84</b>	<b>84</b>	Unknown	5	5			
											<b>60</b>	<b>57</b>			

**Potential Changes in Climate Variables**

**Temperature (°F)**

Scenario	2009	2039	2069	2099	
Annual	50.6	52.4	55.0	55.1	
Average	50.6	53.0	55.5	58.7	
GFDL45	50.6	53.8	56.5	57.6	
GFDL85	50.6	54.0	57.6	61.9	
HAD45	50.6	53.6	57.1	58.6	
HAD85	50.6	53.8	58.3	63.2	
Growing Season	66.7	68.5	70.9	71.3	
May—Sep	66.7	70.4	74.0	75.5	
GFDL45	66.7	71.0	75.3	80.1	
GFDL85	66.7	71.0	75.3	80.1	
HAD45	66.7	70.2	73.4	75.5	
HAD85	66.7	70.1	75.7	81.1	
Coldest Month	25.6	27.3	29.1	29.5	
Average	25.6	28.3	29.6	31.3	
GFDL45	25.6	28.8	29.6	30.5	
GFDL85	25.6	28.9	30.0	31.5	
HAD45	25.6	26.7	29.5	29.6	
HAD85	25.6	27.7	29.9	32.3	
Warmest Month	72.5	74.4	75.7	76.1	
Average	72.5	75.1	76.7	79.0	
GFDL45	72.5	75.6	77.8	79.0	
GFDL85	72.5	77.0	79.4	82.2	
HAD45	72.5	76.3	78.5	80.0	
HAD85	72.5	77.2	81.0	84.7	

**Precipitation (in)**

Scenario	2009	2039	2069	2099	
Annual	38.5	40.7	40.0	41.8	
Total	38.5	40.0	41.6	43.8	
GFDL45	38.5	42.6	44.3	44.8	
GFDL85	38.5	40.1	45.1	46.4	
HAD45	38.5	40.2	40.6	40.0	
HAD85	38.5	41.0	37.9	40.6	
Growing Season	18.5	19.6	18.9	19.6	
May—Sep	18.5	18.5	19.1	18.9	
GFDL45	18.5	20.2	20.1	20.1	
GFDL85	18.5	18.5	19.7	19.6	
HAD45	18.5	19.7	17.4	18.1	
HAD85	18.5	19.3	15.9	16.4	

**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 cherry	Prunus serotina	WDL	Medium	83.4	2386.0	20.0	Lg. dec.	Lg. dec.	Low	Abundant	Poor	Poor			0	1
red maple	Acer rubrum	WDH	High	67.3	1404.7	13.1	Lg. dec.	Lg. dec.	High	Abundant	Good	Good			1	2
sugar maple	Acer saccharum	WDH	High	45.6	762.7	12.4	No change	No change	High	Abundant	Very Good	Very Good			1	3
American elm	Ulmus americana	WDH	Medium	64.5	715.8	6.9	Sm. dec.	Sm. dec.	Medium	Abundant	Fair	Fair			0	4
white ash	Fraxinus americana	WDL	Medium	61.5	572.2	7.5	No change	No change	Low	Abundant	Fair	Fair			0	5
black locust	Robinia pseudoacacia	NDH	Low	38.6	477.1	8.4	Sm. dec.	Sm. dec.	Medium	Common	Poor	Poor			0	6
northern red oak	Quercus rubra	WDH	Medium	54.2	371.0	4.7	Sm. inc.	No change	High	Common	Very Good	Good			1	7
American beech	Fagus grandifolia	WDH	High	29.2	254.3	8.4	Sm. dec.	Sm. dec.	Medium	Common	Poor	Poor			0	8
slippery elm	Ulmus rubra	WSL	Low	44.4	250.9	4.5	No change	No change	Medium	Common	Fair	Fair			1	9
white oak	Quercus alba	WDH	Medium	29.2	226.2	4.5	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	10
black walnut	Juglans nigra	WDH	Low	35.1	217.6	5.2	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	11
sassafras	Sassafras albidum	WSL	Low	28	195.7	4.6	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	12
yellow-poplar	Liriodendron tulipifera	WDH	High	27.1	181.8	5.0	Lg. inc.	Sm. inc.	High	Common	Very Good	Very Good			1	13
black oak	Quercus velutina	WDH	High	18.9	163.3	6.4	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	14
bigtooth aspen	Populus grandidentata	NSL	Medium	12.9	156.7	6.0	Lg. dec.	Very Lg. dec.	Medium	Common	Poor	Lost			0	15
ailanthus	Ailanthus altissima	NSL	FIA	20.1	146.3	3.5	Unknown	Unknown	NA	Common	NNIS	NNIS			0	16
black willow	Salix nigra	NSH	Low	3.6	131.4	21.7	Sm. dec.	Sm. dec.	Low	Common	Poor	Poor	Infill +	Infill +	0	17
shagbark hickory	Carya ovata	WSL	Medium	23.2	122.7	3.7	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	18
eastern white pine	Pinus strobus	WDH	High	7.2	116.8	9.6	Lg. dec.	Very Lg. dec.	Low	Common	Very Poor	Lost			0	19
boxelder	Acer negundo	WSH	Low	13.8	105.7	4.2	Sm. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	20
blackgum	Nyssa sylvatica	WDL	Medium	15.3	89.7	3.4	Sm. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	21
green ash	Fraxinus pennsylvanica	WSH	Low	18.1	82.1	3.6	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	22
sycamore	Platanus occidentalis	NSL	Low	6.9	75.7	8.5	No change	No change	Medium	Common	Fair	Fair			1	23
bitternut hickory	Carya cordiformis	WSL	Low	27.4	72.8	2.1	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	24
silver maple	Acer saccharinum	NSH	Low	2.4	63.6	19.4	Sm. dec.	No change	High	Common	Fair	Good	Infill +	Infill ++	1	25
pin oak	Quercus palustris	NSH	Low	2.7	62.6	5.1	Sm. dec.	No change	Low	Common	Poor	Poor	Infill +	Infill +	0	26
eastern hophornbeam; ironw	Ostrya virginiana	WSL	Low	21	62.2	2.4	No change	No change	High	Common	Good	Good			1	27
American basswood	Tilia americana	WSL	Medium	13.3	57.7	3.4	Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor			0	28
cucumber tree	Magnolia acuminata	NSL	Low	11.5	46.8	3.0	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	29
Osage-orange	Maclura pomifera	NDH	Medium	5	43.2	5.4	Sm. dec.	No change	High	Rare	Poor	Fair	Infill +	Infill +	1	30
eastern cottonwood	Populus deltoides	NSH	Low	7.4	42.8	10.8	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	31
black maple	Acer nigrum	NSH	Low	5.3	41.0	3.5	Lg. dec.	Lg. dec.	High	Rare	Poor	Poor			0	32
shingle oak	Quercus imbricaria	NDH	Medium	11.1	35.3	3.2	Sm. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	33
sweet birch	Betula lenta	NDH	High	9.9	33.2	5.7	Lg. dec.	Lg. dec.	Low	Rare	Very Poor	Very Poor			0	34
hackberry	Celtis occidentalis	WDH	Medium	12.1	31.4	2.1	Lg. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	Infill ++	1	35
Scots pine	Pinus sylvestris	NSH	FIA	2.5	31.2	7.2	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	36
chestnut oak	Quercus prinus	NDH	High	4.5	30.7	4.8	Sm. inc.	No change	High	Rare	Good	Fair	Infill ++	Infill +	2	37
yellow birch	Betula alleghaniensis	NDL	High	0.7	29.4	4.8	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	38
mockernut hickory	Carya alba	WDL	Medium	9.1	28.3	3.0	Lg. inc.	Lg. inc.	High	Rare	Good	Good			1	39
pignut hickory	Carya glabra	WDL	Medium	10.7	21.4	2.1	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	1	40
chokecherry	Prunus virginiana	NSLX	FIA	2.1	21.0	9.9	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	41
American hornbeam; musclev	Carpinus caroliniana	WSL	Low	6.6	20.4	2.4	Sm. dec.	No change	Medium	Rare	Very Poor	Poor			1	42
flowering dogwood	Cornus florida	WDL	Medium	8.7	16.3	0.6	No change	No change	Medium	Rare	Poor	Poor			1	43
serviceberry	Amelanchier spp.	NSL	Low	7.4	16.2	1.7	Sm. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	44
yellow buckeye	Aesculus flava	NSL	Low	1.9	14.2	6.5	Sm. dec.	Sm. dec.	Low	Rare	Very Poor	Very Poor			0	45
Norway maple	Acer platanoides	NSL	FIA	3.5	11.3	1.9	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	46
Ohio buckeye	Aesculus glabra	NSL	Low	2.1	9.8	4.6	Sm. dec.	Sm. 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

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
quaking aspen	Populus tremuloides	WDH	High	1.5	8.9	3.6	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor				0 48
butternut	Juglans cinerea	NSLX	FIA	1.9	8.7	3.8	Unknown	Unknown	Low	Rare	FIA Only	FIA Only				0 49
swamp white oak	Quercus bicolor	NSL	Low	1.4	7.7	3.1	Sm. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor				2 50
pitch pine	Pinus rigida	NSH	High	1.1	7.6	7.2	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor				0 51
eastern hemlock	Tsuga canadensis	NSH	High	1.1	7.5	7.1	Lg. dec.	Lg. dec.	Low	Rare	Very Poor	Very Poor				0 52
scarlet oak	Quercus coccinea	WDL	Medium	5.1	5.7	0.8	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++		2 53
northern catalpa	Catalpa speciosa	NSHX	FIA	0.2	5.4	1.1	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only				0 54
Norway spruce	Picea abies	NSH	FIA	0.4	4.6	1.6	Unknown	Unknown	NA	Rare	NNIS	NNIS				0 55
striped maple	Acer pensylvanicum	NSL	Medium	1.1	4.2	3.9	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor				0 56
pawpaw	Asimina triloba	NSL	Low	1.9	3.7	1.6	Lg. dec.	Very Lg. dec.	Medium	Rare	Very Poor	Lost				0 57
red mulberry	Morus rubra	NSL	Low	1.1	3.3	3.1	Sm. inc.	Lg. inc.	Medium	Rare	Fair	Good		Infill ++		2 58
chinkapin oak	Quercus muehlenbergii	NSL	Medium	1.1	2.6	2.5	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good				2 59
black ash	Fraxinus nigra	WSH	Medium	1.1	1.4	1.3	Very Lg. dec.	Very Lg. dec.	Low	Rare	Lost	Lost				0 60
white mulberry	Morus alba	NSL	FIA	1.1	0.5	0.4	Unknown	Unknown	NA	Rare	NNIS	NNIS				0 61
eastern redcedar	Juniperus virginiana	WDH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate ++	Migrate ++		3 62
shortleaf pine	Pinus echinata	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate ++		3 63
loblolly pine	Pinus taeda	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate ++		3 64
Virginia pine	Pinus virginiana	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Likely +	Likely +		3 65
florida maple	Acer barbatum	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat				3 66
pecan	Carya illinoensis	NSH	Low	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat				3 67
black hickory	Carya texana	NDL	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat				0 68
sugarberry	Celtis laevigata	NDH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat				3 69
eastern redbud	Cercis canadensis	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate ++	Migrate ++		3 70
common persimmon	Diospyros virginiana	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +	Migrate +		3 71
honeylocust	Gleditsia triacanthos	NSH	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +	Migrate +		3 72
loblolly-bay	Gordonia lasianthus	NSH	Medium	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown				0 73
American holly	Ilex opaca	NSL	Medium	0	0	0	Unknown	Unknown	Medium	Modeled	Unknown	Unknown				0 74
sweetgum	Liquidambar styraciflua	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate ++		3 75
bigleaf magnolia	Magnolia macrophylla	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown				0 76
sourwood	Oxydendrum arboreum	NDL	High	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +	Migrate +		3 77
pin cherry	Prunus pensylvanica	NSL	Low	0	0	0	Unknown	Unknown	Medium	Modeled	Unknown	Unknown				0 78
southern red oak	Quercus falcata	WDL	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +	Migrate ++		3 79
blackjack oak	Quercus marilandica	NSL	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat				3 80
Shumard oak	Quercus shumardii	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +	Migrate +		3 81
post oak	Quercus stellata	WDH	High	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate ++	Migrate ++		3 82
bluejack oak	Quercus incana	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown				0 83
winged elm	Ulmus alata	WDL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate ++		3 84