

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 10,188 3,933.4 315

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	17	26	Increase	31	35	Very Good	14	20	Likely	0	0
Hickory	7			Medium	34	52	No Change	9	10	Good	15	12	Infill	8	12
Maple	5	Abundant	4	Low	37	10	Decrease	33	28	Fair	12	13	Migrate	3	7
Oak	17	Common	33	FIA	2		New	12	12	Poor	15	13			
Pine	4	Rare	38				Unknown	5	5	Very Poor	15	13			
Other	40	Absent	15							FIA Only	0	0			
	75		90		90	88		90	90	Unknown	3	3			
											74	74			

Potential Changes in Climate Variables

Temperature (°F)

Scenario	2009	2039	2069	2099		
Annual	CCSM45	60.8	62.5	64.7	64.9	
Average	CCSM85	60.8	62.9	65.5	68.3	
	GFDL45	60.8	63.7	65.5	66.4	
	GFDL85	60.8	63.4	66.6	70.0	
	HAD45	60.8	63.3	66.3	67.6	
	HAD85	60.8	63.7	68.2	71.9	
Growing Season	CCSM45	75.3	76.9	78.7	79.3	
	CCSM85	75.3	77.4	80.0	83.5	
May—Sep	GFDL45	75.3	78.7	80.6	82.1	
	GFDL85	75.3	78.3	82.0	86.0	
	HAD45	75.3	78.8	81.7	83.0	
	HAD85	75.3	79.0	85.6	88.9	
Coldest Month	CCSM45	38.8	40.9	42.1	42.2	
Average	CCSM85	38.8	41.7	42.8	44.3	
	GFDL45	38.8	42.5	42.6	42.8	
	GFDL85	38.8	40.5	41.7	42.2	
	HAD45	38.8	39.2	41.3	41.8	
	HAD85	38.8	40.3	41.9	43.5	
Warmest Month	CCSM45	80.3	81.6	82.5	82.8	
Average	CCSM85	80.3	82.1	83.4	85.3	
	GFDL45	80.3	84.3	84.9	85.9	
	GFDL85	80.3	83.4	85.3	87.5	
	HAD45	80.3	85.0	87.4	87.7	
	HAD85	80.3	85.8	90.3	91.4	

Precipitation (in)

Scenario	2009	2039	2069	2099		
Annual	CCSM45	57.0	58.9	64.4	62.4	
Total	CCSM85	57.0	60.2	61.8	66.7	
	GFDL45	57.0	64.6	68.5	70.1	
	GFDL85	57.0	65.1	68.6	72.2	
	HAD45	57.0	53.7	60.3	61.0	
	HAD85	57.0	57.5	52.1	57.2	
Growing Season	CCSM45	22.1	21.3	21.6	22.3	
	CCSM85	22.1	20.9	20.2	21.9	
May—Sep	GFDL45	22.1	25.4	26.9	27.3	
	GFDL85	22.1	26.8	28.3	29.4	
	HAD45	22.1	19.6	21.4	19.7	
	HAD85	22.1	21.4	15.7	16.9	

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.

Cite as: Iverson, L.R.; Prasad, A.M.; Peters, M.P.; Matthews, S.N. 2019. Facilitating Adaptive Forest Management under Climate Change: A Spatially Specific Synthesis of 125 Species for Habitat Changes and Assisted Migration over the Eastern United States. *Forests*. 10(11): 989. <https://doi.org/10.3390/f10110989>.

One x One Degree
Climate Change Atlas Tree Species

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
loblolly pine	Pinus taeda	WDH	High	90.9	2709.8	23.7	Sm. inc.	Sm. inc.	Medium	Abundant	Very Good	Very Good			1	1
sweetgum	Liquidambar styraciflua	WDH	High	87.5	1004.8	8.5	Sm. inc.	Sm. inc.	Medium	Abundant	Very Good	Very Good			1	2
white oak	Quercus alba	WDH	Medium	74.5	644.7	6.7	Sm. dec.	No change	High	Abundant	Good	Very Good			1	3
southern red oak	Quercus falcata	WDL	Medium	73.1	524.4	5.4	Sm. inc.	Sm. inc.	High	Abundant	Very Good	Very Good			1	4
shortleaf pine	Pinus echinata	WDH	High	65.7	456.1	6.2	Sm. inc.	Lg. inc.	Medium	Common	Good	Very Good			1	5
yellow-poplar	Liriodendron tulipifera	WDH	High	68.6	448.7	5.1	Lg. dec.	Lg. dec.	High	Common	Fair	Fair			1	6
water oak	Quercus nigra	WDH	High	60.1	422.9	5.4	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	7
red maple	Acer rubrum	WDH	High	76.5	416.3	4.5	No change	No change	High	Common	Good	Good			1	8
post oak	Quercus stellata	WDH	High	69.4	374.9	4.2	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	9
eastern redcedar	Juniperus virginiana	WDH	Medium	46.3	312.8	5.5	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	10
mockernut hickory	Carya alba	WDL	Medium	65.3	237.1	2.6	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good			1	11
pignut hickory	Carya glabra	WDL	Medium	57.4	236.8	2.7	Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor			0	12
blackgum	Nyssa sylvatica	WDL	Medium	71.5	222.9	1.9	Sm. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	13
black cherry	Prunus serotina	WDL	Medium	64.5	183.1	2.0	Sm. inc.	Sm. inc.	Low	Common	Fair	Fair			1	14
black oak	Quercus velutina	WDH	High	47.8	156.8	2.4	No change	No change	Medium	Common	Fair	Fair			1	15
cherrybark oak; swamp red o	Quercus pagoda	NSL	Medium	33.4	141.8	3.1	Sm. inc.	Lg. inc.	Medium	Common	Good	Very Good			1	16
green ash	Fraxinus pennsylvanica	WSH	Low	32.8	131.9	2.6	Sm. inc.	Lg. inc.	Medium	Common	Good	Very Good			1	17
winged elm	Ulmus alata	WDL	Medium	55.2	131.6	1.6	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	18
sourwood	Oxydendrum arboreum	NDL	High	35	121.4	2.5	Sm. dec.	Sm. dec.	High	Common	Fair	Fair			1	19
sugarberry	Celtis laevigata	NDH	Medium	13.1	118.6	5.8	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	20
chestnut oak	Quercus prinus	NDH	High	13	115.1	4.4	Lg. dec.	Lg. dec.	High	Common	Fair	Fair	Infill +	Infill +	1	21
flowering dogwood	Cornus florida	WDL	Medium	56.9	113.7	1.4	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	22
willow oak	Quercus phellos	NSL	Low	21.6	112.0	3.9	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	23
American elm	Ulmus americana	WDH	Medium	18.6	111.1	3.5	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	24
black willow	Salix nigra	NSH	Low	20.2	110.7	5.2	Sm. inc.	Lg. inc.	Low	Common	Fair	Good			1	25
sycamore	Platanus occidentalis	NSL	Low	19.6	105.3	4.3	Sm. dec.	No change	Medium	Common	Poor	Fair			1	26
boxelder	Acer negundo	WSH	Low	12.4	103.8	3.3	Lg. dec.	Sm. dec.	High	Common	Fair	Fair			1	27
scarlet oak	Quercus coccinea	WDL	Medium	30.8	101.9	3.0	Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor			0	28
American beech	Fagus grandifolia	WDH	High	20.1	99.1	3.6	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	29
shagbark hickory	Carya ovata	WSL	Medium	19.6	80.3	2.3	Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor			0	30
river birch	Betula nigra	NSL	Low	14.9	80.1	4.9	Sm. inc.	Lg. inc.	Medium	Common	Good	Very Good			1	31
white ash	Fraxinus americana	WDL	Medium	20.6	77.3	3.6	No change	Sm. inc.	Low	Common	Poor	Fair			1	32
American hornbeam; musclev	Carpinus caroliniana	WSL	Low	28.5	71.0	1.7	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	33
Shumard oak	Quercus shumardii	NSL	Low	15	67.4	3.4	Lg. dec.	Sm. dec.	High	Common	Fair	Fair			1	34
sassafras	Sassafras albidum	WSL	Low	25.9	65.6	1.9	Sm. inc.	Lg. inc.	Medium	Common	Good	Very Good			1	35
common persimmon	Diospyros virginiana	NSL	Low	39.6	54.1	0.9	Sm. dec.	No change	High	Common	Fair	Good			1	36
blackjack oak	Quercus marilandica	NSL	Medium	26.1	50.5	1.8	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	37
eastern redbud	Cercis canadensis	NSL	Low	11.5	49.3	2.7	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	38
northern red oak	Quercus rubra	WDH	Medium	17.7	46.8	1.8	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor			1	39
slippery elm	Ulmus rubra	WSL	Low	15.4	42.0	1.9	No change	Sm. inc.	Medium	Rare	Poor	Fair			1	40
red mulberry	Morus rubra	NSL	Low	11.8	40.4	3.4	Lg. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	41
eastern hophornbeam; ironw	Ostrya virginiana	WSL	Low	17.3	40.3	1.4	Lg. inc.	Lg. inc.	High	Rare	Good	Good			1	42
black walnut	Juglans nigra	WDH	Low	7.7	38.2	2.8	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	43
eastern cottonwood	Populus deltoides	NSH	Low	7.9	34.0	4.3	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	44
florida maple	Acer barbatum	NSL	Low	7.4	31.6	1.8	Sm. dec.	No change	High	Rare	Poor	Fair		Infill +	1	45
sweetbay	Magnolia virginiana	NSL	Medium	6	25.7	3.1	Sm. inc.	Sm. inc.	Medium	Rare	Fair	Fair	Infill +	Infill +	1	46
Virginia pine	Pinus virginiana	NDH	High	2.3	21.1	4.6	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	1	47



One x One Degree
Climate Change Atlas Tree Species

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
swamp tupelo	<i>Nyssa biflora</i>	NDH	Medium	5.7	18.0	2.9	No change	No change	Low	Rare	Very Poor	Very Poor				0 48
swamp chestnut oak	<i>Quercus michauxii</i>	NSL	Low	9.7	16.5	1.7	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +		1 49
overcup oak	<i>Quercus lyrata</i>	NSL	Medium	1.4	14.4	1.9	No change	Sm. inc.	Low	Rare	Very Poor	Poor		Infill +		2 50
black locust	<i>Robinia pseudoacacia</i>	NDH	Low	5.1	14.2	2.3	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor				0 51
water tupelo	<i>Nyssa aquatica</i>	NSH	Medium	3.9	13.5	3.4	Sm. dec.	Sm. dec.	Low	Rare	Very Poor	Very Poor				0 52
hackberry	<i>Celtis occidentalis</i>	WDH	Medium	0.4	11.8	4.3	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor		Infill +		2 53
slash pine	<i>Pinus elliotii</i>	NDH	High	1.7	10.0	5.0	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good				2 54
sugar maple	<i>Acer saccharum</i>	WDH	High	2.8	9.9	0.8	Lg. dec.	Lg. dec.	High	Rare	Poor	Poor				0 55
chinkapin oak	<i>Quercus muehlenbergii</i>	NSL	Medium	5.6	9.7	1.3	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor				2 56
shellbark hickory	<i>Carya laciniosa</i>	NSL	Low	3	8.6	1.6	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor				0 57
silver maple	<i>Acer saccharinum</i>	NSH	Low	1.1	6.9	1.7	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor				0 58
bitternut hickory	<i>Carya cordiformis</i>	WSL	Low	4.8	6.9	1.4	Lg. dec.	Sm. dec.	High	Rare	Poor	Poor		Infill +		2 59
Osage-orange	<i>Maclura pomifera</i>	NDH	Medium	2.1	5.7	1.2	Sm. inc.	Lg. inc.	High	Rare	Good	Good				2 60
honeylocust	<i>Gleditsia triacanthos</i>	NSH	Low	1.2	5.7	0.7	No change	Sm. inc.	High	Rare	Fair	Good	Infill +			2 61
American holly	<i>Ilex opaca</i>	NSL	Medium	8.2	5.7	0.6	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++		1 62
bald cypress	<i>Taxodium distichum</i>	NSH	Medium	1	5.5	1.0	Sm. dec.	No change	Medium	Rare	Very Poor	Poor		Infill +		2 63
nuttall oak	<i>Quercus texana</i>	NSH	Medium	1.3	4.5	2.1	Sm. dec.	Lg. dec.	High	Rare	Poor	Poor				0 64
serviceberry	<i>Amelanchier spp.</i>	NSL	Low	4	3.8	0.3	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor				0 65
laurel oak	<i>Quercus laurifolia</i>	NDH	Medium	2.8	3.8	1.2	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++		2 66
yellow buckeye	<i>Aesculus flava</i>	NSL	Low	0.2	3.6	0.8	Sm. dec.	Sm. dec.	Low	Rare	Very Poor	Very Poor				0 67
bigleaf magnolia	<i>Magnolia macrophylla</i>	NSL	Low	0.1	2.9	0.4	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor				0 68
American basswood	<i>Tilia americana</i>	WSL	Medium	1.1	1.1	0.3	Very Lg. dec.	Very Lg. dec.	Medium	Rare	Lost	Lost				0 69
pecan	<i>Carya illinoensis</i>	NSH	Low	1	1.0	1.0	Lg. inc.	Lg. inc.	Low	Rare	Fair	Fair	Infill +	Infill +		2 70
paulownia	<i>Paulownia tomentosa</i>	NSL	FIA	1	1.0	1.0	Unknown	Unknown	NA	Rare	NNIS	NNIS				0 71
cucumbertree	<i>Magnolia acuminata</i>	NSL	Low	0.9	0.6	0.6	Very Lg. dec.	Very Lg. dec.	Medium	Rare	Lost	Lost				0 72
pawpaw	<i>Asimina triloba</i>	NSL	Low	0.2	0.6	0.1	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor				0 73
ailanthus	<i>Ailanthus altissima</i>	NSL	FIA	0.1	0.6	0.0	Unknown	Unknown	NA	Rare	NNIS	NNIS				0 74
black hickory	<i>Carya texana</i>	NDL	High	1	0.3	0.4	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good				2 75
ashe juniper	<i>Juniperus ashei</i>	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat				0 76
longleaf pine	<i>Pinus palustris</i>	NSH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate ++	Migrate +		3 77
Table Mountain pine	<i>Pinus pungens</i>	NSL	Low	0	0	0	Unknown	Unknown	High	Absent	Unknown	Unknown				0 78
striped maple	<i>Acer pensylvanicum</i>	NSL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat				3 79
cittamwood/gum bumelia	<i>Sideroxylon lanuginosum ssp.</i>	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat		Migrate +		3 80
water hickory	<i>Carya aquatica</i>	NSL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +		3 81
black ash	<i>Fraxinus nigra</i>	WSH	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat				3 82
silverbell	<i>Halesia spp.</i>	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown				0 83
southern magnolia	<i>Magnolia grandiflora</i>	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +			3 84
redbay	<i>Persea borbonia</i>	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat				3 85
water elm	<i>Planera aquatica</i>	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +		3 86
pin cherry	<i>Prunus pensylvanica</i>	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown				0 87
live oak	<i>Quercus virginiana</i>	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate ++		3 88
bluejack oak	<i>Quercus incana</i>	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +		3 89
cedar elm	<i>Ulmus crassifolia</i>	NDH	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat	Migrate +	Migrate ++		3 90