

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 10,533 4,066.9 372

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	Scenario	Scenario	Scenario	SHIFT	SHIFT			
				High	26	Increase	RCP45	RCP85	Very Good	13	13	Likely	2	2
Ash	2			Medium	35	No Change	15	14	Good	16	16	Infill	11	16
Hickory	6			Low	38	Decrease	25	24	Fair	9	10	Migrate	1	3
Maple	3	Abundant	5	FIA	2	New	10	10	Poor	12	12			
Oak	20	Common	20			Unknown	9	9	Very Poor	20	16			
Pine	6	Rare	48						FIA Only	2	2			
Other	36	Absent	13						Unknown	7	7			
	73		86				90	90		79	76		14	21

Potential Changes in Climate Variables

Temperature (°F)

	Scenario	2009	2039	2069	2099	
Annual Average	CCSM45	65.1	66.7	68.6	68.6	
	CCSM85	65.1	66.9	69.4	71.8	
	GFDL45	65.1	67.8	69.6	70.3	
	GFDL85	65.1	67.5	70.6	74.1	
	HAD45	65.1	67.2	69.9	71.4	
	HAD85	65.1	67.5	71.2	75.0	
Growing Season (May—Sep)	CCSM45	77.5	78.9	80.4	80.8	
	CCSM85	77.5	78.9	81.4	84.4	
	GFDL45	77.5	80.1	81.9	83.2	
	GFDL85	77.5	79.9	83.0	87.0	
	HAD45	77.5	80.6	82.8	84.5	
	HAD85	77.5	80.5	85.8	89.2	
Coldest Month (Average)	CCSM45	46.3	48.4	49.2	49.0	
	CCSM85	46.3	48.3	49.5	50.7	
	GFDL45	46.3	49.4	49.7	49.9	
	GFDL85	46.3	48.1	49.2	49.7	
	HAD45	46.3	46.3	47.8	48.6	
	HAD85	46.3	47.5	48.6	50.4	
Warmest Month (Average)	CCSM45	81.0	82.4	83.0	83.3	
	CCSM85	81.0	82.4	83.7	85.4	
	GFDL45	81.0	83.6	84.3	85.0	
	GFDL85	81.0	83.0	84.4	86.7	
	HAD45	81.0	84.9	86.4	87.1	
	HAD85	81.0	84.9	88.2	89.8	

Precipitation (in)

	Scenario	2009	2039	2069	2099	
Annual Total	CCSM45	57.7	59.6	63.3	62.9	
	CCSM85	57.7	60.9	62.4	68.5	
	GFDL45	57.7	63.8	67.8	69.2	
	GFDL85	57.7	63.8	67.1	66.3	
	HAD45	57.7	56.1	62.2	62.4	
	HAD85	57.7	62.7	56.1	58.7	
Growing Season (May—Sep)	CCSM45	24.4	26.1	27.4	27.1	
	CCSM85	24.4	24.8	25.9	28.0	
	GFDL45	24.4	29.4	31.9	30.9	
	GFDL85	24.4	30.1	33.1	33.0	
	HAD45	24.4	23.7	25.5	24.9	
	HAD85	24.4	25.9	20.4	21.4	

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-DGP30 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>.

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	92.8	4361.7	35.2	No change	No change	Medium	Abundant	Good	Good			1	1
water oak	Quercus nigra	WDH	High	94.7	1089.8	8.5	Sm. inc.	Sm. inc.	Medium	Abundant	Very Good	Very Good			1	2
sweetgum	Liquidambar styraciflua	WDH	High	90	822.6	6.7	Sm. inc.	Sm. inc.	Medium	Abundant	Very Good	Very Good			1	3
longleaf pine	Pinus palustris	NSH	Medium	26	752.5	18.1	Sm. inc.	Sm. inc.	Medium	Abundant	Very Good	Very Good			1	4
slash pine	Pinus elliottii	NDH	High	26.7	609.3	14.2	Lg. inc.	Lg. inc.	Medium	Abundant	Very Good	Very Good			1	5
laurel oak	Quercus laurifolia	NDH	Medium	60.9	460.9	6.2	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	6
sweetbay	Magnolia virginiana	NSL	Medium	57.6	362.5	5.2	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	7
yellow-poplar	Liriodendron tulipifera	WDH	High	63.2	357.9	4.2	No change	No change	High	Common	Good	Good			1	8
red maple	Acer rubrum	WDH	High	75	315.3	3.2	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good			1	9
blackgum	Nyssa sylvatica	WDL	Medium	73.2	293.0	3.2	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good			1	10
shortleaf pine	Pinus echinata	WDH	High	33.4	188.6	3.8	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	11
southern red oak	Quercus falcata	WDL	Medium	50.6	184.3	2.2	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	12
post oak	Quercus stellata	WDH	High	35.7	146.1	3.3	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	13
flowering dogwood	Cornus florida	WDL	Medium	51.3	125.3	1.8	No change	No change	Medium	Common	Fair	Fair			1	14
American hornbeam; muscley	Carpinus caroliniana	WDL	Low	33.6	120.6	2.5	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	15
black cherry	Prunus serotina	WDL	Medium	55	115.9	1.8	Lg. inc.	Lg. inc.	Low	Common	Good	Good			1	16
eastern redcedar	Juniperus virginiana	WDH	Medium	33.5	115.1	2.3	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	17
southern magnolia	Magnolia grandiflora	NSL	Low	28.3	104.4	2.9	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	18
white oak	Quercus alba	WDH	Medium	35.5	100.8	2.3	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good			1	19
swamp tupelo	Nyssa biflora	NDH	Medium	21.2	90.8	3.6	Lg. inc.	Lg. inc.	Low	Common	Good	Good			1	20
spruce pine	Pinus glabra	NSL	Low	32.5	86.5	2.1	Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor			0	21
American holly	Ilex opaca	NSL	Medium	46	73.0	1.3	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	22
mockernut hickory	Carya alba	WDL	Medium	29.1	65.7	1.8	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	23
common persimmon	Diospyros virginiana	NSL	Low	33.1	62.4	1.4	Lg. dec.	Sm. dec.	High	Common	Fair	Fair			1	24
American beech	Fagus grandifolia	WDH	High	18.7	58.2	2.4	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good	Infill ++	Infill ++	1	25
pignut hickory	Carya glabra	WDL	Medium	23.2	48.7	1.6	No change	Sm. inc.	Medium	Rare	Poor	Fair			1	26
green ash	Fraxinus pennsylvanica	WSH	Low	19.6	47.2	1.8	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			1	27
winged elm	Ulmus alata	WDL	Medium	20.1	33.4	1.2	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			1	28
sourwood	Oxydendrum arboreum	NDL	High	16	29.2	1.4	Lg. dec.	Lg. dec.	High	Rare	Poor	Poor			1	29
eastern hophornbeam; ironw	Ostrya virginiana	WSL	Low	13.2	28.1	1.2	Lg. inc.	Lg. inc.	High	Rare	Good	Good			1	30
willow oak	Quercus phellos	NSL	Low	7.4	26.7	3.0	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	1	31
live oak	Quercus virginiana	NDH	High	4.4	26.0	2.2	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	32
swamp chestnut oak	Quercus michauxii	NSL	Low	13	24.7	1.5	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	33
sycamore	Platanus occidentalis	NSL	Low	11.7	23.6	1.7	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	34
bald cypress	Taxodium distichum	NSH	Medium	8.2	23.1	2.7	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	1	35
river birch	Betula nigra	NSL	Low	6.9	21.6	2.3	Sm. inc.	Sm. inc.	Medium	Rare	Fair	Fair	Infill +	Infill +	1	36
American elm	Ulmus americana	WDH	Medium	15.9	18.6	0.8	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	1	37
black oak	Quercus velutina	WDH	High	4.9	17.7	2.9	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	38
florida maple	Acer barbatum	NSL	Low	12.2	17.3	0.9	Lg. dec.	Lg. dec.	High	Rare	Poor	Poor		Infill +	1	39
black willow	Salix nigra	NSH	Low	4.8	15.8	2.2	No change	Sm. inc.	Low	Rare	Very Poor	Poor		Infill +	1	40
water hickory	Carya aquatica	NSL	Medium	3.4	15.0	2.7	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	41
pecan	Carya illinoensis	NSH	Low	3.3	12.0	2.1	No change	No change	Low	Rare	Very Poor	Very Poor			2	42
shagbark hickory	Carya ovata	WSL	Medium	2.6	11.1	1.8	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	43
sassafras	Sassafras albidum	WSL	Low	9.9	10.1	0.8	Sm. inc.	Sm. inc.	Medium	Rare	Fair	Fair			1	44
red mulberry	Morus rubra	NSL	Low	7.8	8.0	0.8	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	1	45
sugarberry	Celtis laevigata	NDH	Medium	7.4	7.0	0.7	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	1	46
cherrybark oak; swamp red o	Quercus pagoda	NSL	Medium	1.6	6.8	1.4	Sm. inc.	Sm. inc.	Medium	Rare	Fair	Fair	Infill +	Infill +	2	47

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
eastern redbud	Cercis canadensis	NSL	Low	5	5.5	0.7	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor				0 48
Shumard oak	Quercus shumardii	NSL	Low	1.5	4.9	1.8	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor				0 49
durand oak	Quercus sinuata var. sinuata	NSL	FIA	1.8	4.3	1.1	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only				0 50
American basswood	Tilia americana	WSL	Medium	1.1	3.8	1.0	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor				0 51
turkey oak	Quercus laevis	NSH	Medium	2.2	3.8	0.9	No change	No change	High	Rare	Fair	Fair	Infill +			2 52
redbay	Persea borbonia	NSL	Low	3.6	3.5	0.9	No change	No change	High	Rare	Fair	Fair	Infill +	Infill +		1 53
chestnut oak	Quercus prinus	NDH	High	1.5	3.5	1.6	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor				0 54
blackjack oak	Quercus marilandica	NSL	Medium	2.6	3.4	1.1	Lg. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	Infill ++		2 55
eastern cottonwood	Populus deltoides	NSH	Low	1.3	3.2	1.1	Sm. dec.	Very Lg. dec.	Medium	Rare	Very Poor	Lost				0 56
bluejack oak	Quercus incana	NSL	Low	3.6	3.1	0.8	No change	No change	Medium	Rare	Poor	Poor		Infill +		2 57
black walnut	Juglans nigra	WDH	Low	1.7	3.0	0.6	Lg. dec.	Very Lg. dec.	Medium	Rare	Very Poor	Lost				0 58
northern red oak	Quercus rubra	WDH	Medium	0.7	2.6	2.2	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor				0 59
boxelder	Acer negundo	WSH	Low	1.9	2.5	1.3	No change	No change	High	Rare	Fair	Fair		Infill +		2 60
white ash	Fraxinus americana	WDL	Medium	1.7	2.5	1.1	No change	No change	Low	Rare	Very Poor	Very Poor				2 61
water tupelo	Nyssa aquatica	NSH	Medium	2.4	2.0	0.6	Sm. dec.	No change	Low	Rare	Very Poor	Very Poor				0 62
wild plum	Prunus americana	NSLX	FIA	3.8	1.5	0.4	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only				0 63
bigleaf magnolia	Magnolia macrophylla	NSL	Low	2.8	1.4	0.5	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor				0 64
pin cherry	Prunus pensylvanica	NSL	Low	1.9	1.0	0.5	Lg. dec.	Very Lg. dec.	Medium	Rare	Very Poor	Lost				0 65
bitternut hickory	Carya cordiformis	WSL	Low	0.7	1.0	0.8	Very Lg. dec.	Very Lg. dec.	High	Rare	Lost	Lost				0 66
slippery elm	Ulmus rubra	WSL	Low	0.8	0.9	0.8	No change	No change	Medium	Rare	Poor	Poor		Infill +		2 67
Virginia pine	Pinus virginiana	NDH	High	1.9	0.9	0.5	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor				0 68
cucumbertree	Magnolia acuminata	NSL	Low	1.9	0.8	0.4	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor				0 69
chinkapin oak	Quercus muehlenbergii	NSL	Medium	0.7	0.7	0.6	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor				0 70
scarlet oak	Quercus coccinea	WDL	Medium	0.9	0.7	0.7	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor				0 71
overcup oak	Quercus lyrata	NSL	Medium	0.7	0.5	0.4	Lg. inc.	Lg. inc.	Low	Rare	Fair	Fair		Infill +		2 72
pawpaw	Asimina triloba	NSL	Low	0.9	0.3	0.3	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor				0 73
Atlantic white-cedar	Chamaecyparis thyoides	NSH	Low	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat	Likely +	Likely +		3 74
Table Mountain pine	Pinus pungens	NSL	Low	0	0	0	Unknown	Unknown	High	Absent	Unknown	Unknown				0 75
striped maple	Acer pensylvanicum	NSL	Medium	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown				0 76
silver maple	Acer saccharinum	NSH	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat				3 77
serviceberry	Amelanchier spp.	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat				3 78
cittamwood/gum bumelia	Sideroxylon lanuginosum ssp.	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat				3 79
shellbark hickory	Carya laciniosa	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown				0 80
black hickory	Carya texana	NDL	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +		3 81
hackberry	Celtis occidentalis	WDH	Medium	0	0	0	Unknown	Unknown	High	Modeled	Unknown	Unknown				0 82
black ash	Fraxinus nigra	WSH	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat				0 83
honeylocust	Gleditsia triacanthos	NSH	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat		Migrate +		3 84
silverbell	Halesia spp.	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat				3 85
Osage-orange	Maclura pomifera	NDH	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Likely +	Likely +		3 86
water elm	Planera aquatica	NSL	Low	0	0	0	Unknown	Unknown	Medium	Modeled	Unknown	Unknown				0 87
nuttall oak	Quercus texana	NSH	Medium	0	0	0	Unknown	Unknown	High	Modeled	Unknown	Unknown				0 88
black locust	Robinia pseudoacacia	NDH	Low	0	0	0	Unknown	Unknown	Medium	Modeled	Unknown	Unknown				0 89
cedar elm	Ulmus crassifolia	NDH	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat		Migrate ++		3 90