

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 9,549.4 3,687.0 293

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	22	26	Increase	23	25	Very Good	10	8	Likely	3	3
Hickory	4			Medium	24	46	No Change	14	18	Good	10	18	Infill	10	10
Maple	6	Abundant	6	Low	36	14	Decrease	22	16	Fair	16	14	Migrate	6	11
Oak	8	Common	25	FIA	8		New	16	17	Poor	11	9			
Pine	7	Rare	36				Unknown	15	14	Very Poor	8	8			
Other	40	Absent	23							FIA Only	4	4			
	67		90		90	86		90	90	Unknown	7	6			
											66	67			

Potential Changes in Climate Variables

Temperature (°F)

	Scenario	2009	2039	2069	2099	
Annual Average	CCSM45	49.0	50.9	53.3	53.5	
	CCSM85	49.0	51.3	53.9	57.0	
	GFDL45	49.0	51.8	54.8	55.9	
	GFDL85	49.0	52.5	56.0	60.1	
	HAD45	49.0	51.7	55.2	56.6	
	HAD85	49.0	52.0	56.3	61.0	
Growing Season (May—Sep)	CCSM45	64.4	66.3	68.5	69.0	
	CCSM85	64.4	66.7	69.3	73.4	
	GFDL45	64.4	67.6	71.6	73.1	
	GFDL85	64.4	68.8	73.0	77.5	
	HAD45	64.4	67.6	70.9	72.8	
	HAD85	64.4	67.6	73.0	78.2	
Coldest Month Average	CCSM45	25.3	27.1	28.8	29.2	
	CCSM85	25.3	27.9	29.2	30.7	
	GFDL45	25.3	28.5	29.2	30.0	
	GFDL85	25.3	28.2	29.3	30.6	
	HAD45	25.3	26.4	28.7	28.8	
	HAD85	25.3	27.1	29.0	31.0	
Warmest Month Average	CCSM45	69.8	72.0	73.2	73.6	
	CCSM85	69.8	72.3	74.0	76.1	
	GFDL45	69.8	73.2	75.5	76.9	
	GFDL85	69.8	74.8	77.3	80.1	
	HAD45	69.8	73.5	75.9	77.2	
	HAD85	69.8	74.3	77.9	81.4	

Precipitation (in)

	Scenario	2009	2039	2069	2099	
Annual Total	CCSM45	47.6	51.0	51.0	52.5	
	CCSM85	47.6	50.7	52.5	56.9	
	GFDL45	47.6	52.3	53.4	54.4	
	GFDL85	47.6	48.8	54.6	55.9	
	HAD45	47.6	50.3	50.4	50.3	
	HAD85	47.6	51.4	47.9	50.8	
Growing Season (May—Sep)	CCSM45	22.0	24.1	24.0	24.1	
	CCSM85	22.0	23.5	23.7	25.0	
	GFDL45	22.0	23.6	23.1	23.2	
	GFDL85	22.0	21.4	22.9	23.1	
	HAD45	22.0	24.0	21.4	22.2	
	HAD85	22.0	23.3	20.5	21.3	

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
red maple	Acer rubrum	WDH	High	87.9	1844.8	15.6	Sm. dec.	Sm. dec.	High	Abundant	Good	Good			1	1
black cherry	Prunus serotina	WDL	Medium	79.2	1355.0	12.4	Sm. dec.	Lg. dec.	Low	Abundant	Fair	Poor			0	2
sugar maple	Acer saccharum	WDH	High	71.4	986.0	10.8	No change	Sm. dec.	High	Abundant	Very Good	Good			1	3
northern red oak	Quercus rubra	WDH	Medium	72.4	795.0	8.0	No change	No change	High	Abundant	Very Good	Very Good			1	4
yellow-poplar	Liriodendron tulipifera	WDH	High	51.7	752.9	10.5	Sm. inc.	No change	High	Abundant	Very Good	Very Good			1	5
chestnut oak	Quercus prinus	NDH	High	50.7	605.3	7.4	Sm. inc.	Sm. inc.	High	Abundant	Very Good	Very Good			1	6
black locust	Robinia pseudoacacia	NDH	Low	52.9	490.7	5.0	No change	No change	Medium	Common	Fair	Fair			1	7
white oak	Quercus alba	WDH	Medium	51	473.8	6.1	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	8
sweet birch	Betula lenta	NDH	High	65.7	435.9	5.5	Sm. dec.	Sm. dec.	Low	Common	Poor	Poor			0	9
American beech	Fagus grandifolia	WDH	High	32.3	256.8	6.0	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	10
white ash	Fraxinus americana	WDL	Medium	50.9	225.9	2.9	Sm. inc.	Sm. inc.	Low	Common	Fair	Fair			1	11
sassafras	Sassafras albidum	WSL	Low	43.4	225.5	3.9	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	12
American basswood	Tilia americana	WSL	Medium	28.5	208.6	6.1	No change	No change	Medium	Common	Fair	Fair			1	13
eastern hemlock	Tsuga canadensis	NSH	High	23.1	190.5	7.3	No change	No change	Low	Common	Poor	Poor			0	14
scarlet oak	Quercus coccinea	WDL	Medium	29.7	187.3	4.0	Lg. inc.	Sm. inc.	Medium	Common	Very Good	Good			1	15
pignut hickory	Carya glabra	WDL	Medium	37.5	181.8	2.9	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	16
black oak	Quercus velutina	WDH	High	26.6	177.4	3.2	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	17
blackgum	Nyssa sylvatica	WDL	Medium	43.9	172.1	2.5	Sm. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	18
yellow birch	Betula alleghaniensis	NDL	High	22.2	171.9	6.3	Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor			0	19
Virginia pine	Pinus virginiana	NDH	High	6.2	150.2	9.5	No change	No change	Medium	Common	Fair	Fair	Infill +	Infill +	1	20
Norway spruce	Picea abies	NSH	FIA	8.3	121.9	14.2	Unknown	Unknown	NA	Common	NNIS	NNIS			0	21
shagbark hickory	Carya ovata	WSL	Medium	23.7	109.3	2.9	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	22
red spruce	Picea rubens	NDH	High	8.2	86.2	6.7	Sm. dec.	Sm. dec.	Low	Common	Poor	Poor			0	23
cucumbertree	Magnolia acuminata	NSL	Low	38.5	84.1	1.8	No change	No change	Medium	Common	Fair	Fair			1	24
slippery elm	Ulmus rubra	WSL	Low	21.5	83.0	2.4	Sm. dec.	No change	Medium	Common	Poor	Fair			1	25
pin cherry	Prunus pensylvanica	NSL	Low	13	82.4	6.0	Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor			0	26
Scots pine	Pinus sylvestris	NSH	FIA	6.2	71.9	11.4	Unknown	Unknown	NA	Common	NNIS	NNIS			0	27
American elm	Ulmus americana	WDH	Medium	9	70.2	4.0	No change	No change	Medium	Common	Fair	Fair	Infill +	Infill +	1	28
sourwood	Oxydendrum arboreum	NDL	High	11.5	66.4	3.7	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good	Infill ++	Infill ++	1	29
eastern white pine	Pinus strobus	WDH	High	7.5	62.6	7.4	Sm. inc.	Sm. inc.	Low	Common	Fair	Fair			1	30
serviceberry	Amelanchier spp.	NSL	Low	33.5	54.0	1.4	Sm. dec.	No change	Medium	Common	Poor	Fair			1	31
pitch pine	Pinus rigida	NSH	High	4	49.4	7.5	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	1	32
mockernut hickory	Carya alba	WDL	Medium	17.9	46.3	1.3	Lg. inc.	Lg. inc.	High	Rare	Good	Good			1	33
American hornbeam; muscle	Carpinus caroliniana	WSL	Low	13.9	45.0	2.8	Lg. dec.	No change	Medium	Rare	Very Poor	Poor			1	34
red pine	Pinus resinosa	NSH	Medium	4.1	42.0	9.9	Very Lg. dec.	Very Lg. dec.	Low	Rare	Lost	Lost			0	35
ailanthus	Ailanthus altissima	NSL	FIA	6.2	39.6	1.7	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	36
black walnut	Juglans nigra	WDH	Low	10.8	38.7	1.4	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			1	37
bigtooth aspen	Populus grandidentata	NSL	Medium	9.3	36.1	2.9	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	38
sycamore	Platanus occidentalis	NSL	Low	6.7	35.6	1.8	Sm. inc.	Sm. inc.	Medium	Rare	Fair	Fair	Infill +	Infill +	1	39
striped maple	Acer pensylvanicum	NSL	Medium	21.7	32.6	1.2	Sm. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	40
eastern redcedar	Juniperus virginiana	WDH	Medium	3.4	30.8	6.2	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	2	41
boxelder	Acer negundo	WSH	Low	4.3	28.7	2.5	No change	No change	High	Rare	Fair	Fair	Infill +	Infill +	1	42
quaking aspen	Populus tremuloides	WDH	High	1	28.5	27.2	Very Lg. dec.	Lg. dec.	Medium	Rare	Lost	Very Poor			0	43
bitternut hickory	Carya cordiformis	WSL	Low	12.2	27.9	1.7	Lg. inc.	Lg. inc.	High	Rare	Good	Good			1	44
black maple	Acer nigrum	NSH	Low	2.3	21.0	2.5	Lg. dec.	Lg. dec.	High	Rare	Poor	Poor			0	45
flowering dogwood	Cornus florida	WDL	Medium	6.7	16.9	1.1	Sm. inc.	Lg. inc.	Medium	Rare	Fair	Good			1	46
eastern hophornbeam; ironw	Ostrya virginiana	WSL	Low	12.2	15.2	1.1	Sm. inc.	Lg. inc.	High	Rare	Good	Good			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
honeylocust	Gleditsia triacanthos	NSH	Low	0.4	14.0	5.3	Sm. dec.	No change	High	Rare	Poor	Fair		Infill +	2	48
bear oak; scrub oak	Quercus ilicifolia	NSLX	FIA	1	12.8	12.2	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	49
mountain or Fraser magnolia	Magnolia fraseri	NSL	Low	0.8	10.6	7.2	No change	No change	Low	Rare	Very Poor	Very Poor			0	50
hackberry	Celtis occidentalis	WDH	Medium	1.7	6.1	2.8	No change	Sm. inc.	High	Rare	Fair	Good			2	51
balsam fir	Abies balsamea	NDH	High	0.7	5.6	3.7	Very Lg. dec.	Very Lg. dec.	Low	Rare	Lost	Lost			0	52
paulownia	Paulownia tomentosa	NSL	FIA	1	5.0	4.8	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	53
Osage-orange	Maclura pomifera	NDH	Medium	0.4	5.0	1.9	Sm. dec.	Sm. inc.	High	Rare	Poor	Good			2	54
Table Mountain pine	Pinus pungens	NSL	Low	1.7	4.1	1.6	No change	No change	High	Rare	Fair	Fair	Infill +	Infill +	2	55
common persimmon	Diospyros virginiana	NSL	Low	0.3	4.1	1.0	No change	Lg. inc.	High	Rare	Fair	Good			2	56
green ash	Fraxinus pennsylvanica	WSH	Low	1	3.8	3.7	Sm. inc.	Lg. inc.	Medium	Rare	Fair	Good	Infill +		2	57
butternut	Juglans cinerea	NSLX	FIA	2.1	3.2	1.5	Unknown	Unknown	Low	Rare	FIA Only	FIA Only			0	58
pawpaw	Asimina triloba	NSL	Low	1	2.9	2.8	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	59
chinkapin oak	Quercus muehlenbergii	NSL	Medium	0.1	2.9	0.2	Sm. inc.	Lg. inc.	Medium	Rare	Fair	Good	Infill +		2	60
pin oak	Quercus palustris	NSH	Low	0.6	2.6	1.4	Sm. dec.	No change	Low	Rare	Very Poor	Very Poor			2	61
shortleaf pine	Pinus echinata	WDH	High	1.2	2.0	0.6	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	62
chokecherry	Prunus virginiana	NSLX	FIA	1.2	1.6	0.5	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	63
American chestnut	Castanea dentata	NSLX	FIA	2.1	1.5	0.7	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	64
Ohio buckeye	Aesculus glabra	NSL	Low	1	1.3	1.3	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	65
silver maple	Acer saccharinum	NSH	Low	0.6	1.1	0.6	Very Lg. dec.	No change	High	Rare	Lost	Fair	Infill +		2	66
American mountain-ash	Sorbus americana	NSL	Low	0.8	0.4	0.3	Lg. dec.	Lg. dec.	Low	Rare	Very Poor	Very Poor			0	67
loblolly pine	Pinus taeda	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate ++	3	68
northern white-cedar	Thuja occidentalis	WSH	High	0	0	0	Unknown	New Habitat	Medium	Absent	Unknown	New Habitat			3	69
florida maple	Acer barbatum	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	70
mountain maple	Acer spicatum	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Likely +	Likely +	3	71
yellow buckeye	Aesculus flava	NSL	Low	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat	Likely +	Likely +	3	72
gray birch	Betula populifolia	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	73
cittamwood/gum bumelia	Sideroxylon lanuginosum ssp.	NSL	Low	0	0	0	Unknown	New Habitat	High	Absent	Unknown	New Habitat			0	74
pecan	Carya illinoensis	NSH	Low	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat		Migrate +	3	75
shellbark hickory	Carya laciniosa	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	76
black hickory	Carya texana	NDL	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			0	77
sugarberry	Celtis laevigata	NDH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +	3	78
eastern redbud	Cercis canadensis	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Likely +	Likely +	3	79
sweetgum	Liquidambar styraciflua	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate ++	3	80
southern magnolia	Magnolia grandiflora	NSL	Low	0	0	0	New Habitat	Unknown	Medium	Absent	New Habitat	Unknown			3	81
bigleaf magnolia	Magnolia macrophylla	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	82
red mulberry	Morus rubra	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +	3	83
southern red oak	Quercus falcata	WDL	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +	Migrate ++	3	84
cherrybark oak; swamp red o.	Quercus pagoda	NSL	Medium	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	85
blackjack oak	Quercus marilandica	NSL	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +	Migrate ++	3	86
Shumard oak	Quercus shumardii	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat		Migrate +	3	87
post oak	Quercus stellata	WDH	High	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate ++	Migrate ++	3	88
bluejack oak	Quercus incana	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	89
winged elm	Ulmus alata	WDL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate ++	3	90