

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	10,066	3,886.5	172

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	12	22	Increase	22	24	Very Good	4	5	Likely	2	2
Hickory	6			Medium	24	35	No Change	8	9	Good	18	21	Infill	11	12
Maple	3	Abundant	2	Low	27	7	Decrease	20	17	Fair	7	4	Migrate	4	4
Oak	14	Common	19	FIA	3		New	11	11	Poor	12	13			
Pine	2	Rare	32				Unknown	5	5	Very Poor	9	7			
Other	25	Absent	12							FIA Only	2	2			
	53		65		66	64		66	66	Unknown	2	2			
											54	54			

Potential Changes in Climate Variables

Temperature (°F)

	Scenario	2009	2039	2069	2099	
Annual Average	CCSM45	61.0	62.8	64.6	65.1	
	CCSM85	61.0	63.5	65.7	68.5	
	GFDL45	61.0	65.5	65.9	67.1	
	GFDL85	61.0	64.0	66.8	70.6	
	HAD45	61.0	63.3	66.0	67.3	
	HAD85	61.0	63.5	68.1	71.4	
Growing Season (May—Sep)	CCSM45	76.5	78.4	80.0	80.6	
	CCSM85	76.5	79.4	81.6	84.9	
	GFDL45	76.5	82.2	82.3	84.6	
	GFDL85	76.5	80.4	83.6	88.4	
	HAD45	76.5	78.9	81.5	82.6	
	HAD85	76.5	79.4	84.8	87.7	
Coldest Month (Average)	CCSM45	37.3	39.7	40.8	41.3	
	CCSM85	37.3	39.9	40.8	42.4	
	GFDL45	37.3	41.2	41.4	41.5	
	GFDL85	37.3	38.6	40.1	40.7	
	HAD45	37.3	38.0	40.2	40.3	
	HAD85	37.3	40.0	41.9	43.5	
Warmest Month (Average)	CCSM45	82.7	84.5	85.6	86.0	
	CCSM85	82.7	85.9	86.7	88.5	
	GFDL45	82.7	87.6	88.6	90.3	
	GFDL85	82.7	87.3	89.0	92.9	
	HAD45	82.7	85.2	86.8	87.3	
	HAD85	82.7	86.4	89.2	90.3	

Precipitation (in)

	Scenario	2009	2039	2069	2099	
Annual Total	CCSM45	44.5	42.7	44.8	44.1	
	CCSM85	44.5	42.9	44.9	45.7	
	GFDL45	44.5	46.8	50.7	46.4	
	GFDL85	44.5	46.9	52.4	51.2	
	HAD45	44.5	45.1	47.0	48.3	
	HAD85	44.5	47.9	41.5	45.3	
Growing Season (May—Sep)	CCSM45	21.1	19.4	19.3	19.5	
	CCSM85	21.1	20.0	18.5	19.6	
	GFDL45	21.1	22.3	23.4	22.3	
	GFDL85	21.1	22.6	25.4	23.7	
	HAD45	21.1	21.2	21.5	21.7	
	HAD85	21.1	22.3	16.9	18.5	

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
post oak	Quercus stellata	WDH	High	80.1	2015.2	24.9	Sm. dec.	Sm. dec.	High	Abundant	Good	Good			1	1
winged elm	Ulmus alata	WDL	Medium	88.1	572.1	8.5	No change	No change	Medium	Abundant	Good	Good			1	2
blackjack oak	Quercus marilandica	NSL	Medium	69.5	466.4	8.0	No change	No change	High	Common	Good	Good			1	3
black oak	Quercus velutina	WDH	High	50.5	365.7	9.1	Sm. dec.	Sm. dec.	Medium	Common	Poor	Poor			0	4
shortleaf pine	Pinus echinata	WDH	High	18.1	364.4	13.2	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	5
eastern redcedar	Juniperus virginiana	WDH	Medium	48.8	354.8	7.4	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	6
black hickory	Carya texana	NDL	High	61.4	336.1	5.4	Sm. dec.	No change	Medium	Common	Poor	Fair			1	7
American elm	Ulmus americana	WDH	Medium	47.9	236.2	8.5	No change	Sm. inc.	Medium	Common	Fair	Good			1	8
mockernut hickory	Carya alba	WDL	Medium	38.9	173.7	3.9	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good			1	9
common persimmon	Diospyros virginiana	NSL	Low	44.3	170.4	8.0	Sm. dec.	Sm. dec.	High	Common	Fair	Fair			1	10
green ash	Fraxinus pennsylvanica	WSH	Low	40.4	153.5	6.8	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	11
sycamore	Platanus occidentalis	NSL	Low	21.9	136.8	10.5	Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor			0	12
sugarberry	Celtis laevigata	NDH	Medium	43.1	122.9	5.3	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	13
black willow	Salix nigra	NSH	Low	17.3	95.2	11.2	No change	No change	Low	Common	Poor	Poor			0	14
water oak	Quercus nigra	WDH	High	11.3	77.2	4.3	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good	Infill ++	Infill ++	1	15
pecan	Carya illinoensis	NSH	Low	40.2	75.5	6.7	Sm. inc.	Lg. inc.	Low	Common	Fair	Good			1	16
honeylocust	Gleditsia triacanthos	NSH	Low	37.1	75.4	3.7	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good			1	17
white ash	Fraxinus americana	WDL	Medium	26.8	72.7	3.3	Lg. inc.	Lg. inc.	Low	Common	Good	Good			1	18
river birch	Betula nigra	NSL	Low	10.1	64.4	13.6	Lg. dec.	Sm. dec.	Medium	Common	Poor	Poor			0	19
hackberry	Celtis occidentalis	WDH	Medium	31.7	55.8	2.9	No change	Sm. inc.	High	Common	Good	Very Good			1	20
Shumard oak	Quercus shumardii	NSL	Low	19.1	53.9	3.9	Sm. dec.	Sm. dec.	High	Common	Fair	Fair	Infill +	Infill +	1	21
slippery elm	Ulmus rubra	WDL	Low	18.6	44.5	3.7	Sm. inc.	Lg. inc.	Medium	Rare	Fair	Good			1	22
Osage-orange	Maclura pomifera	NDH	Medium	19.2	35.9	3.4	Lg. inc.	Lg. inc.	High	Rare	Good	Good			1	23
pin oak	Quercus palustris	NSH	Low	16	34.7	4.2	Lg. dec.	Lg. dec.	Low	Rare	Very Poor	Very Poor			0	24
red mulberry	Morus rubra	NSL	Low	20.1	31.0	2.3	Sm. dec.	No change	Medium	Rare	Very Poor	Poor			1	25
northern red oak	Quercus rubra	WDH	Medium	16.8	30.9	2.3	Sm. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	Infill ++	1	26
black walnut	Juglans nigra	WDH	Low	15.9	30.6	5.0	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	27
black cherry	Prunus serotina	WDL	Medium	26.6	30.4	1.8	Lg. inc.	Lg. inc.	Low	Rare	Fair	Fair			1	28
loblolly pine	Pinus taeda	WDH	High	4.8	27.8	18.2	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	2	29
bitternut hickory	Carya cordiformis	WSL	Low	15.9	27.7	2.1	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor	Infill +	Infill +	1	30
boxelder	Acer negundo	WSH	Low	16.3	27.5	4.3	Sm. inc.	Lg. inc.	High	Rare	Good	Good			1	31
wild plum	Prunus americana	NSLX	FIA	11.6	27.1	1.9	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	32
white oak	Quercus alba	WDH	Medium	1.7	22.3	5.0	Sm. inc.	Sm. inc.	High	Rare	Good	Good	Infill ++	Infill ++	2	33
pignut hickory	Carya glabra	WDL	Medium	2.5	21.2	4.4	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			2	34
chinkapin oak	Quercus muehlenbergii	NSL	Medium	7.6	20.3	3.0	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	35
sassafras	Sassafras albidum	WSL	Low	19.3	20.0	2.6	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			1	36
cittamwood/gum bumelia	Sideroxylon lanuginosum ssp.	NSL	Low	19.3	16.8	1.9	Lg. inc.	Lg. inc.	High	Rare	Good	Good			1	37
southern red oak	Quercus falcata	WDL	Medium	1.2	15.4	3.0	Lg. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	Infill ++	2	38
flowering dogwood	Cornus florida	WDL	Medium	8	12.2	1.1	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	1	39
red maple	Acer rubrum	WDH	High	1.4	9.1	3.0	Sm. inc.	Sm. inc.	High	Rare	Good	Good			2	40
silver maple	Acer saccharinum	NSH	Low	11.2	8.1	5.1	Lg. dec.	Lg. dec.	High	Rare	Poor	Poor			1	41
eastern redbud	Cercis canadensis	NSL	Low	22.3	7.9	0.9	Sm. inc.	Lg. inc.	Medium	Rare	Fair	Good			1	42
bur oak	Quercus macrocarpa	NDH	Medium	8.1	6.5	1.2	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor		Infill +	2	43
blackgum	Nyssa sylvatica	WDL	Medium	2	5.9	3.0	Lg. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	Infill ++	2	44
eastern cottonwood	Populus deltoides	NSH	Low	4.9	5.9	3.5	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	45
swamp chestnut oak	Quercus michauxii	NSL	Low	1	3.7	3.7	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	46
cherrybark oak; swamp red o	Quercus pagoda	NSL	Medium	1	3.4	3.4	Sm. dec.	No change	Medium	Rare	Very Poor	Poor			0	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
white mulberry	Morus alba	NSL	FIA	1	1.5	1.5	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	48
nuttall oak	Quercus texana	NSH	Medium	3	1.4	4.2	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor			0	49
serviceberry	Amelanchier spp.	NSL	Low	2	1.1	0.5	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	50
shellbark hickory	Carya laciniosa	NSL	Low	0.2	0.5	0.1	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	51
Texas ash	Fraxinus texensis	NDH	FIA	2.4	0.3	0.7	Unknown	Unknown	NA	Rare	FIA Only	FIA Only			0	52
black locust	Robinia pseudoacacia	NDH	Low	2.8	0.1	0.3	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	53
ashe juniper	Juniperus ashei	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			0	54
slash pine	Pinus elliottii	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	55
longleaf pine	Pinus palustris	NSH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	56
florida maple	Acer barbatum	NSL	Low	0	0	0	Unknown	Unknown	High	Modeled	Unknown	Unknown			0	57
American hornbeam; muscle	Carpinus caroliniana	WSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate ++	Migrate ++	3	58
black ash	Fraxinus nigra	WSH	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat			0	59
sweetgum	Liquidambar styraciflua	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate ++	Migrate ++	3	60
eastern hophornbeam; ironw	Ostrya virginiana	WSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Likely +	Likely +	3	61
sourwood	Oxydendrum arboreum	NDL	High	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			3	62
pin cherry	Prunus pensylvanica	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	63
laurel oak	Quercus laurifolia	NDH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	64
live oak	Quercus virginiana	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate ++	Migrate ++	3	65
cedar elm	Ulmus crassifolia	NDH	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat	Likely +	Likely +	3	66