

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 61

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	1			High	7	12	Increase	5	7	Very Good	1	1	Likely	0	0
Hickory	1			Medium	13	25	No Change	7	5	Good	2	3	Infill	16	15
Maple	2	Abundant	0	Low	20	5	Decrease	12	12	Fair	9	10	Migrate	6	9
Oak	3	Common	9	FIA	4		New	12	12	Poor	6	5		22	24
Pine	2	Rare	19				Unknown	8	8	Very Poor	4	4			
Other	19	Absent	15					44	44	FIA Only	2	2			
	28		43		44	42				Unknown	4	4			
											28	29			

Potential Changes in Climate Variables

Temperature (°F)

Scenario	2009	2039	2069	2099		
Annual	CCSM45	53.7	55.5	57.5	58.1	
Average	CCSM85	53.7	56.1	58.6	61.1	
	GFDL45	53.7	59.5	58.7	59.9	
	GFDL85	53.7	56.6	59.6	63.8	
	HAD45	53.7	56.2	59.2	60.4	
	HAD85	53.7	56.7	61.5	64.7	
Growing Season	CCSM45	71.9	74.1	76.1	76.9	
	CCSM85	71.9	74.8	77.3	80.2	
May—Sep	GFDL45	71.9	79.6	77.9	80.1	
	GFDL85	71.9	75.6	79.0	84.4	
	HAD45	71.9	74.0	76.3	77.5	
	HAD85	71.9	74.7	79.7	82.6	
Coldest Month	CCSM45	25.6	27.2	28.5	29.3	
	CCSM85	25.6	27.8	28.8	30.4	
Average	GFDL45	25.6	29.2	29.6	29.8	
	GFDL85	25.6	27.8	29.2	30.4	
	HAD45	25.6	27.6	30.5	30.2	
	HAD85	25.6	29.7	32.6	34.6	
Warmest Month	CCSM45	78.8	81.2	82.7	83.4	
	CCSM85	78.8	82.6	84.1	85.8	
Average	GFDL45	78.8	82.7	84.0	85.6	
	GFDL85	78.8	83.1	84.4	88.6	
	HAD45	78.8	80.8	82.5	83.2	
	HAD85	78.8	82.7	85.4	86.9	

Precipitation (in)

Scenario	2009	2039	2069	2099		
Annual	CCSM45	33.5	33.5	34.3	32.6	
Total	CCSM85	33.5	34.0	33.7	34.8	
	GFDL45	33.5	37.2	39.1	37.5	
	GFDL85	33.5	37.5	42.7	40.2	
	HAD45	33.5	37.1	36.9	37.3	
	HAD85	33.5	35.6	33.8	37.5	
Growing Season	CCSM45	21.3	20.6	20.9	19.6	
	CCSM85	21.3	20.8	20.1	20.7	
May—Sep	GFDL45	21.3	24.0	24.2	22.9	
	GFDL85	21.3	24.0	26.9	24.4	
	HAD45	21.3	22.3	23.1	23.0	
	HAD85	21.3	21.8	19.8	20.5	

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
eastern redcedar	Juniperus virginiana	WDH	Medium	50.8	370.5	16.3	Sm. dec.	Sm. dec.	Medium	Common	Poor	Poor	Infill +	Infill +	0	1
hackberry	Celtis occidentalis	WDH	Medium	59.8	261.6	20.4	Sm. dec.	Sm. dec.	High	Common	Fair	Fair	Infill +	Infill +	1	2
American elm	Ulmus americana	WDH	Medium	76	211.4	15.1	No change	No change	Medium	Common	Fair	Fair	Infill +	Infill +	1	3
bur oak	Quercus macrocarpa	NDH	Medium	37.1	197.8	14.6	Lg. dec.	Lg. dec.	High	Common	Fair	Fair	Infill +	Infill +	1	4
chinkapin oak	Quercus muehlenbergii	NSL	Medium	26.8	127.4	20.9	Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor	Infill +	Infill +	2	5
honeylocust	Gleditsia triacanthos	NSH	Low	28.1	96.1	8.8	No change	No change	High	Common	Good	Good	Infill ++	Infill ++	1	6
black walnut	Juglans nigra	WDH	Low	34.1	88.4	8.2	No change	No change	Medium	Common	Fair	Fair	Infill +	Infill +	1	7
green ash	Fraxinus pennsylvanica	WDH	Low	41.7	83.7	6.1	No change	No change	Medium	Common	Fair	Fair	Infill +	Infill +	1	8
Osage-orange	Maclura pomifera	NSH	Medium	29.5	75.8	8.6	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good	Infill ++	Infill ++	1	9
eastern cottonwood	Populus deltoides	NSH	Low	34.9	45.7	13.9	Sm. inc.	Sm. inc.	Medium	Rare	Fair	Fair	Infill +	Infill +	1	10
red mulberry	Morus rubra	NSL	Low	35	43.0	7.9	Sm. inc.	Sm. inc.	Medium	Rare	Fair	Fair	Infill +	Infill +	1	11
bitternut hickory	Carya cordiformis	WSL	Low	16.1	41.1	7.0	Lg. dec.	Lg. dec.	High	Rare	Poor	Poor	Infill +	Infill +	2	12
eastern redbud	Cercis canadensis	NSL	Low	18.1	34.0	3.7	Lg. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			2	13
black willow	Salix nigra	NSH	Low	18	30.6	12.4	Sm. inc.	Lg. inc.	Low	Rare	Poor	Fair	Infill +	Infill +	2	14
Siberian elm	Ulmus pumila	NDH	FIA	12.6	8.9	11.3	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	15
Kentucky coffeetree	Gymnocladus dioicus	NSLX	FIA	5.7	6.7	1.4	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			2	16
white mulberry	Morus alba	NSL	FIA	5.2	5.7	5.8	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	17
northern red oak	Quercus rubra	WDH	Medium	1	4.9	4.7	No change	No change	High	Rare	Fair	Fair	Infill +	Infill +	2	18
American basswood	Tilia americana	WSL	Medium	9.3	4.1	4.0	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	19
slippery elm	Ulmus rubra	WSL	Low	10	3.8	1.2	No change	Sm. inc.	Medium	Rare	Poor	Fair	Infill +	Infill +	2	20
boxelder	Acer negundo	WSH	Low	3.4	3.6	2.4	No change	Sm. inc.	High	Rare	Fair	Good	Infill +		2	21
sycamore	Platanus occidentalis	NSL	Low	11.6	3.1	3.7	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	22
eastern white pine	Pinus strobus	WDH	High	3.4	2.5	7.5	Sm. dec.	Sm. dec.	Low	Rare	Very Poor	Very Poor			0	23
eastern hophornbeam; ironw	Ostrya virginiana	WSL	Low	4	1.5	5.6	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor			0	24
silver maple	Acer saccharinum	NSH	Low	4.2	1.1	4.1	Very Lg. dec.	Lg. dec.	High	Rare	Lost	Poor			0	25
Ohio buckeye	Aesculus glabra	NSL	Low	1	1.0	1.0	Very Lg. dec.	Very Lg. dec.	Medium	Rare	Lost	Lost			0	26
shortleaf pine	Pinus echinata	WDH	High	3.4	0.8	2.3	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	27
wild plum	Prunus americana	NSLX	FIA	7.5	0.7	1.2	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	28
ashe juniper	Juniperus ashei	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			0	29
serviceberry	Amelanchier spp.	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	30
cittamwood/gum bumelia	Sideroxylon lanuginosum ssp.	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	31
pecan	Carya illinoensis	NSH	Low	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat	Migrate ++	Migrate ++	3	32
shagbark hickory	Carya ovata	WSL	Medium	0	0	0	Unknown	Unknown	Medium	Modeled	Unknown	Unknown			0	33
black hickory	Carya texana	NDL	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	34
sugarberry	Celtis laevigata	NDH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate ++	3	35
white ash	Fraxinus americana	WDL	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat		Migrate +	3	36
bigleaf magnolia	Magnolia macrophylla	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	37
pin cherry	Prunus pensylvanica	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	38
blackjack oak	Quercus marilandica	NSL	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	39
post oak	Quercus stellata	WDH	High	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +	Migrate ++	3	40
black oak	Quercus velutina	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +	3	41
live oak	Quercus virginiana	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			0	42
black locust	Robinia pseudoacacia	NDH	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate ++	3	43
cedar elm	Ulmus crassifolia	NDH	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat			3	44