

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	9,941.4	3,838.4	83

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	12	21	Increase	21	21	Very Good	1	2
Hickory	5			Medium	22	32	No Change	9	10	Good	17	17
Maple	5	Abundant	0	Low	25	7	Decrease	15	14	Fair	8	7
Oak	9	Common	11	FIA	4		New	11	12	Poor	10	11
Pine	1	Rare	38				Unknown	7	6	Very Poor	6	6
Other	27	Absent	14							FIA Only	1	1
	49		63		63	60		63	63	Unknown	3	2
											46	46

Potential Changes in Climate Variables

Temperature (°F)

	Scenario	2009	2039	2069	2099	
Annual Average	CCSM45	59.2	61.1	62.9	63.3	
	CCSM85	59.2	61.7	63.9	66.7	
	GFDL45	59.2	64.9	64.2	65.3	
	GFDL85	59.2	62.1	65.0	68.9	
	HAD45	59.2	61.6	64.3	65.6	
	HAD85	59.2	61.8	66.4	69.8	
Growing Season (May-Sep)	CCSM45	75.3	77.4	79.0	79.7	
	CCSM85	75.3	78.4	80.5	83.9	
	GFDL45	75.3	83.0	81.4	83.6	
	GFDL85	75.3	79.1	82.5	87.5	
	HAD45	75.3	77.7	80.1	81.4	
	HAD85	75.3	78.2	83.6	86.5	
Coldest Month Average	CCSM45	34.3	36.4	37.6	38.2	
	CCSM85	34.3	36.9	37.8	39.5	
	GFDL45	34.3	38.4	38.7	38.6	
	GFDL85	34.3	36.0	37.4	38.1	
	HAD45	34.3	35.1	37.6	37.6	
	HAD85	34.3	37.2	39.2	40.9	
Warmest Month Average	CCSM45	81.6	83.9	84.9	85.4	
	CCSM85	81.6	85.0	85.9	87.7	
	GFDL45	81.6	86.5	87.6	89.2	
	GFDL85	81.6	86.1	87.7	91.8	
	HAD45	81.6	84.1	85.8	86.4	
	HAD85	81.6	85.4	88.2	89.4	

Precipitation (in)

	Scenario	2009	2039	2069	2099	
Annual Total	CCSM45	42.6	40.6	42.8	41.9	
	CCSM85	42.6	41.1	42.5	43.6	
	GFDL45	42.6	45.6	48.3	45.2	
	GFDL85	42.6	45.5	51.8	50.5	
	HAD45	42.6	43.4	44.8	46.3	
	HAD85	42.6	45.1	40.0	43.7	
Growing Season (May-Sep)	CCSM45	21.6	19.3	20.0	19.8	
	CCSM85	21.6	20.3	19.2	20.2	
	GFDL45	21.6	23.2	23.4	22.9	
	GFDL85	21.6	23.3	26.6	24.8	
	HAD45	21.6	21.4	22.0	22.6	
	HAD85	21.6	22.6	17.9	19.3	

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
post oak	Quercus stellata	WDH	High	39.7	317.6	15.1	No change	No change	High	Common	Good	Good	Infill ++	Infill ++	1	1
black oak	Quercus velutina	WDH	High	24.5	266.8	18.9	Sm. dec.	Sm. dec.	Medium	Common	Poor	Poor	Infill +	Infill +	0	2
American elm	Ulmus americana	WDH	Medium	60.9	206.2	11.4	Sm. dec.	Sm. dec.	Medium	Common	Poor	Poor			0	3
pecan	Carya illinoensis	NSH	Low	47.7	184.7	13.5	Sm. dec.	Sm. dec.	Low	Common	Poor	Poor			0	4
Osage-orange	Maclura pomifera	NDH	Medium	12.5	108.3	14.3	Sm. dec.	Sm. dec.	High	Common	Fair	Fair	Infill +	Infill +	2	5
hackberry	Celtis occidentalis	WDH	Medium	57.4	80.4	9.6	No change	No change	High	Common	Good	Good			1	6
blackjack oak	Quercus marilandica	NSL	Medium	32	70.6	5.1	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good	Infill ++	Infill ++	1	7
sugarberry	Celtis laevigata	NDH	Medium	50.3	70.4	10.6	Sm. inc.	Sm. inc.	Medium	Common	Good	Good	Infill ++	Infill ++	1	8
black hickory	Carya texana	NDL	High	26.4	64.0	5.6	Sm. inc.	Sm. inc.	Medium	Common	Good	Good	Infill ++	Infill ++	1	9
green ash	Fraxinus pennsylvanica	WSH	Low	51.3	54.6	6.9	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	10
honeylocust	Gleditsia triacanthos	NSH	Low	30.6	51.4	16.8	No change	Sm. inc.	High	Common	Good	Very Good	Infill ++	Infill ++	1	11
bitternut hickory	Carya cordiformis	WSL	Low	35.4	49.1	4.3	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor	Infill +	Infill +	1	12
winged elm	Ulmus alata	WDL	Medium	23.6	32.3	4.2	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	1	13
common persimmon	Diospyros virginiana	NSL	Low	39.3	29.4	4.2	Lg. inc.	Sm. inc.	High	Rare	Good	Good	Infill ++	Infill ++	1	14
white oak	Quercus alba	WDH	Medium	7.5	27.9	4.9	No change	No change	High	Rare	Fair	Fair	Infill +	Infill +	2	15
eastern redcedar	Juniperus virginiana	WDH	Medium	12.6	24.2	5.3	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	1	16
northern red oak	Quercus rubra	WDH	Medium	12.1	23.6	3.8	Sm. inc.	Sm. inc.	High	Rare	Good	Good	Infill ++	Infill ++	2	17
sycamore	Platanus occidentalis	NSL	Low	29.2	22.8	3.1	Sm. inc.	Sm. inc.	Medium	Rare	Fair	Fair	Infill +	Infill +	1	18
black walnut	Juglans nigra	WDH	Low	17.9	21.6	5.0	Sm. inc.	Sm. inc.	Medium	Rare	Fair	Fair	Infill +	Infill +	1	19
Siberian elm	Ulmus pumila	NDH	FIA	5	21.2	18.0	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	20
eastern redbud	Cercis canadensis	NSL	Low	19.8	21.1	3.2	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	21
wild plum	Prunus americana	NSLX	FIA	10.2	20.3	3.9	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	22
black cherry	Prunus serotina	WDL	Medium	19.4	19.4	3.8	Sm. inc.	Sm. inc.	Low	Rare	Poor	Poor	Infill +	Infill +	1	23
chinkapin oak	Quercus muehlenbergii	NSL	Medium	19.7	19.0	1.9	Sm. inc.	No change	Medium	Rare	Fair	Poor	Infill +	Infill +	1	24
slippery elm	Ulmus rubra	WSL	Low	19.2	17.2	3.8	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	1	25
pin oak	Quercus palustris	NSH	Low	13.7	17.1	5.8	Sm. dec.	Lg. dec.	Low	Rare	Very Poor	Very Poor			0	26
pignut hickory	Carya glabra	WDL	Medium	0.5	17.1	8.2	Lg. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			2	27
black locust	Robinia pseudoacacia	NDH	Low	5.8	15.1	2.9	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	28
silver maple	Acer saccharinum	NSH	Low	5.5	14.7	5.0	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor			0	29
shortleaf pine	Pinus echinata	WDH	High	2.4	14.4	3.4	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	2	30
red mulberry	Morus rubra	NSL	Low	34.7	13.7	1.8	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	1	31
mockernut hickory	Carya alba	WDL	Medium	10.4	13.4	1.3	Lg. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	Infill ++	2	32
red maple	Acer rubrum	WDH	High	3.4	12.4	2.3	No change	No change	High	Rare	Fair	Fair	Infill +	Infill +	2	33
white ash	Fraxinus americana	WDL	Medium	29.7	12.2	2.1	Lg. inc.	Lg. inc.	Low	Rare	Fair	Fair	Infill +	Infill +	1	34
Shumard oak	Quercus shumardii	NSL	Low	19.6	10.6	5.8	Sm. inc.	Sm. inc.	High	Rare	Good	Good	Infill ++	Infill ++	1	35
black willow	Salix nigra	NSH	Low	4.3	10.6	8.6	No change	No change	Low	Rare	Very Poor	Very Poor			2	36
sassafras	Sassafras albidum	WSL	Low	6.2	6.7	0.9	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	37
boxelder	Acer negundo	WSH	Low	19.9	6.6	3.2	Lg. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	Infill ++	1	38
bur oak	Quercus macrocarpa	NDH	Medium	18.6	5.9	4.6	Lg. dec.	Lg. dec.	High	Rare	Poor	Poor	Infill +		2	39
flowering dogwood	Cornus florida	WDL	Medium	6.5	5.3	1.1	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	1	40
ailanthus	Ailanthus altissima	NSL	FIA	0.5	2.7	1.3	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	41
blackgum	Nyssa sylvatica	WDL	Medium	1.9	1.1	0.5	Lg. inc.	Lg. inc.	High	Rare	Good	Good			2	42
sugar maple	Acer saccharum	WDH	High	2.8	1.0	0.6	Very Lg. dec.	No change	High	Rare	Lost	Fair			0	43
American basswood	Tilia americana	WSL	Medium	1	1.0	1.0	Very Lg. dec.	Very Lg. dec.	Medium	Rare	Lost	Lost			0	44
florida maple	Acer barbatum	NSL	Low	3.3	0.8	0.5	Very Lg. dec.	Very Lg. dec.	High	Rare	Lost	Lost			0	45
eastern cottonwood	Populus deltoides	NSH	Low	7.3	0.6	0.9	Sm. inc.	Lg. inc.	Medium	Rare	Fair	Good	Infill +		2	46
cittamwood/gum bumelia	Sideroxylon lanuginosum ssp.	NSL	Low	8	0.4	0.8	Lg. inc.	Lg. inc.	High	Rare	Good	Good			2	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	4	0.2	0.8	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	48
serviceberry	Amelanchier spp.	NSL	Low	0.5	0.2	0.1	Sm. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	49
ashe juniper	Juniperus ashei	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			0	50
slash pine	Pinus elliottii	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	51
longleaf pine	Pinus palustris	NSH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	52
loblolly pine	Pinus taeda	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Likely +	Likely +	3	53
river birch	Betula nigra	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate ++	3	54
American hornbeam; musclev	Carpinus caroliniana	WSL	Low	0	0	0	Unknown	New Habitat	Medium	Absent	Unknown	New Habitat		Migrate +	3	55
black ash	Fraxinus nigra	WSH	Medium	0	0	0	Unknown	Unknown	Low	Absent	Unknown	Unknown			0	56
sweetgum	Liquidambar styraciflua	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate ++	3	57
eastern hophornbeam; ironw	Ostrya virginiana	WSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate ++	Migrate ++	3	58
pin cherry	Prunus pensylvanica	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	59
southern red oak	Quercus falcata	WDL	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Likely +	Likely +	3	60
water oak	Quercus nigra	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate ++	3	61
live oak	Quercus virginiana	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate ++	Migrate ++	3	62
cedar elm	Ulmus crassifolia	NDH	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat	Migrate ++	Migrate ++	3	63