

One x One Degree
Climate Change Atlas Tree Species
 Current and Potential Future Habitat, Capability, and Migration

Area of Region sq. km sq. mi FIA Plots
 9,813.8 3,789.1 186

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	17	26	Increase	35	37	Very Good	14	15	Likely	2	2
Hickory	7			Medium	32	49	No Change	14	12	Good	18	18	Infill	20	19
Maple	4	Abundant	0	Low	34	9	Decrease	17	17	Fair	11	13	Migrate	3	6
Oak	18	Common	35	FIA	4		New	15	15	Poor	15	12			
Pine	2	Rare	35				Unknown	6	6	Very Poor	7	7			
Other	36	Absent	17							FIA Only	2	2			
	70		87		87	84		87	87	Unknown	2	2			
											69	69			

Potential Changes in Climate Variables

Temperature (°F)

Scenario	2009	2039	2069	2099	
Annual	56.8	58.6	60.7	61.0	
Average	56.8	59.0	61.8	64.7	
GFDL45	56.8	60.8	61.9	62.8	
GFDL85	56.8	59.7	62.8	66.5	
HAD45	56.8	59.6	62.7	64.3	
HAD85	56.8	59.9	64.6	68.6	
Growing Season	73.1	75.0	76.6	77.3	
May—Sep	73.1	75.5	78.4	82.1	
GFDL45	73.1	77.9	79.1	80.5	
GFDL85	73.1	76.6	80.4	84.9	
HAD45	73.1	76.5	79.5	81.3	
HAD85	73.1	76.9	83.1	86.9	
Coldest Month	31.2	33.0	34.7	35.0	
Average	31.2	34.1	35.2	36.8	
GFDL45	31.2	35.7	35.9	36.3	
GFDL85	31.2	33.7	34.8	35.4	
HAD45	31.2	32.7	35.1	35.3	
HAD85	31.2	33.8	36.0	37.8	
Warmest Month	79.0	80.8	81.8	82.2	
Average	79.0	81.6	83.3	85.0	
GFDL45	79.0	82.6	83.8	84.8	
GFDL85	79.0	82.8	84.6	87.3	
HAD45	79.0	82.9	85.1	86.0	
HAD85	79.0	84.7	88.7	90.4	

Precipitation (in)

Scenario	2009	2039	2069	2099	
Annual	46.7	45.2	51.8	49.7	
Total	46.7	49.7	50.1	52.5	
GFDL45	46.7	53.9	57.1	58.0	
GFDL85	46.7	53.7	59.9	61.9	
HAD45	46.7	46.3	50.2	49.8	
HAD85	46.7	48.2	45.7	50.0	
Growing Season	19.2	17.8	19.8	18.5	
May—Sep	19.2	19.8	18.0	19.1	
GFDL45	19.2	22.2	22.5	23.3	
GFDL85	19.2	22.4	23.6	24.5	
HAD45	19.2	17.6	17.3	16.8	
HAD85	19.2	17.9	14.4	14.6	

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
white oak	Quercus alba	WDH	Medium	59.7	471.5	8.6	No change	Sm. dec.	High	Common	Good	Fair			1	1
black oak	Quercus velutina	WDH	High	48.5	443.5	8.3	Sm. dec.	Sm. dec.	Medium	Common	Poor	Poor			0	2
sugar maple	Acer saccharum	WDH	High	62.1	420.6	8.7	Sm. dec.	Sm. dec.	High	Common	Fair	Fair			1	3
yellow-poplar	Liriodendron tulipifera	WDH	High	40.7	340.3	10.5	Lg. dec.	Lg. dec.	High	Common	Fair	Fair			1	4
pignut hickory	Carya glabra	WDL	Medium	55.8	304.7	6.3	Sm. dec.	Sm. dec.	Medium	Common	Poor	Poor			0	5
black willow	Salix nigra	NSH	Low	23.8	260.0	16.9	No change	No change	Low	Common	Poor	Poor			0	6
green ash	Fraxinus pennsylvanica	WSH	Low	53.6	252.3	5.7	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	7
sweetgum	Liquidambar styraciflua	WDH	High	32.2	231.8	8.1	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	8
American elm	Ulmus americana	WDH	Medium	69.3	202.9	4.9	Sm. inc.	Lg. inc.	Medium	Common	Good	Very Good			1	9
post oak	Quercus stellata	WDH	High	28.4	190.6	4.8	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	10
silver maple	Acer saccharinum	NSH	Low	32.8	187.5	10.9	No change	No change	High	Common	Good	Good			1	11
sassafras	Sassafras albidum	WSL	Low	63.3	184.2	3.7	Sm. dec.	No change	Medium	Common	Poor	Fair			1	12
boxelder	Acer negundo	WSH	Low	43.2	174.2	5.9	No change	Sm. inc.	High	Common	Good	Very Good			1	13
eastern redcedar	Juniperus virginiana	WDH	Medium	24.1	141.4	4.3	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	14
winged elm	Ulmus alata	WDL	Medium	56.3	128.0	2.9	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	15
shagbark hickory	Carya ovata	WSL	Medium	52.2	113.7	3.9	No change	No change	Medium	Common	Fair	Fair			1	16
pin oak	Quercus palustris	NSH	Low	22.5	109.5	7.8	Lg. dec.	Lg. dec.	Low	Common	Very Poor	Very Poor			0	17
northern red oak	Quercus rubra	WDH	Medium	38.3	101.7	3.0	Sm. inc.	No change	High	Common	Very Good	Good			1	18
hackberry	Celtis occidentalis	WDH	Medium	48.4	101.6	4.4	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good			1	19
white ash	Fraxinus americana	WDL	Medium	36.1	99.9	3.5	Lg. inc.	Lg. inc.	Low	Common	Good	Good			1	20
black locust	Robinia pseudoacacia	NDH	Low	7.6	95.2	16.1	No change	No change	Medium	Common	Fair	Fair	Infill +	Infill +	1	21
sycamore	Platanus occidentalis	NSL	Low	18.1	91.0	5.6	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	22
mockernut hickory	Carya alba	WDL	Medium	30.3	86.8	3.4	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	23
black cherry	Prunus serotina	WDL	Medium	38.5	86.8	2.8	Sm. inc.	Sm. inc.	Low	Common	Fair	Fair			1	24
black walnut	Juglans nigra	WDH	Low	28	84.1	4.2	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	25
black hickory	Carya texana	NDL	High	24.1	80.1	3.6	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good	Infill ++	Infill ++	1	26
slippery elm	Ulmus rubra	WSL	Low	44.6	79.1	2.7	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	27
blackgum	Nyssa sylvatica	WDL	Medium	33.7	70.7	2.5	Sm. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	28
eastern cottonwood	Populus deltoides	NSH	Low	13.3	69.8	7.3	Sm. dec.	Sm. dec.	Medium	Common	Poor	Poor	Infill +	Infill +	0	29
shingle oak	Quercus illicifolia	NDH	Medium	16.8	66.1	5.9	Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor	Infill +	Infill +	0	30
American beech	Fagus grandifolia	WDH	High	21.4	62.4	4.0	Sm. inc.	Sm. inc.	Medium	Common	Good	Good	Infill ++	Infill ++	1	31
red maple	Acer rubrum	WDH	High	34.6	59.3	2.3	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	32
bitternut hickory	Carya cordiformis	WSL	Low	22.5	58.6	3.6	Sm. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	33
scarlet oak	Quercus coccinea	WDL	Medium	5.6	50.7	5.0	Sm. dec.	Sm. dec.	Medium	Common	Poor	Poor	Infill +	Infill +	0	34
common persimmon	Diospyros virginiana	NSL	Low	27.4	50.3	2.7	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	35
eastern hophornbeam; ironw	Ostrya virginiana	WSL	Low	30	46.2	2.1	Sm. inc.	Sm. inc.	High	Rare	Good	Good			1	36
pecan	Carya illinoensis	NSH	Low	19.3	42.8	3.6	Lg. inc.	Lg. inc.	Low	Rare	Fair	Fair	Infill +	Infill +	1	37
honeylocust	Gleditsia triacanthos	NSH	Low	17.8	40.2	3.7	Lg. inc.	Lg. inc.	High	Rare	Good	Good			1	38
red mulberry	Morus rubra	NSL	Low	30.4	34.4	1.8	No change	Sm. inc.	Medium	Rare	Poor	Fair			1	39
flowering dogwood	Cornus florida	WDL	Medium	22.1	34.2	1.3	Sm. inc.	Sm. inc.	Medium	Rare	Fair	Fair			1	40
cherrybark oak; swamp red o.	Quercus pagoda	NSL	Medium	16.8	33.7	3.0	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	1	41
chinkapin oak	Quercus muehlenbergii	NSL	Medium	21.9	31.6	1.7	Sm. inc.	Sm. inc.	Medium	Rare	Fair	Fair	Infill +	Infill +	1	42
bald cypress	Taxodium distichum	NSH	Medium	2	25.2	12.4	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	43
shortleaf pine	Pinus echinata	WDH	High	5.2	24.7	12.1	Sm. inc.	Lg. inc.	Medium	Rare	Fair	Good			1	44
southern red oak	Quercus falcata	WDL	Medium	11	20.5	4.4	Lg. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	Infill ++	1	45
pumpkin ash	Fraxinus profunda	NSH	FIA	5.5	20.3	4.5	Unknown	Unknown	NA	Rare	FIA Only	FIA Only			0	46
sugarberry	Celtis laevigata	NDH	Medium	7.6	17.9	3.0	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	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				
loblolly pine	Pinus taeda	WDH	High	1	16.4	16.1	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good				2	48			
Shumard oak	Quercus shumardii	NSL	Low	1.5	15.8	6.7	No change	Sm. inc.	High	Rare	Fair	Good	Infill +				2	49		
pawpaw	Asimina triloba	NSL	Low	16.9	15.4	1.1	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor					0	50		
eastern redbud	Cercis canadensis	NSL	Low	9.5	14.9	1.4	No change	No change	Medium	Rare	Poor	Poor						1	51	
blackjack oak	Quercus marilandica	NSL	Medium	1.1	13.1	0.7	Lg. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	Infill ++				2	52	
water tupelo	Nyssa aquatica	NSH	Medium	4.4	12.8	8.4	Sm. dec.	Sm. dec.	Low	Rare	Very Poor	Very Poor						0	53	
river birch	Betula nigra	NSL	Low	6.2	11.9	3.0	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +				1	54	
swamp chestnut oak	Quercus michauxii	NSL	Low	1.8	9.0	3.4	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +				2	55	
chestnut oak	Quercus prinus	NDH	High	1	9.0	8.9	No change	No change	High	Rare	Fair	Fair	Infill +	Infill +				2	56	
shellbark hickory	Carya laciniosa	NSL	Low	3.8	8.1	9.8	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +				2	57	
overcup oak	Quercus lyrata	NSL	Medium	5.8	7.9	2.1	Sm. inc.	Lg. inc.	Low	Rare	Poor	Fair	Infill +	Infill +				2	58	
American hornbeam; musclev	Carpinus caroliniana	WSL	Low	10.6	7.4	1.0	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++				1	59	
serviceberry	Amelanchier spp.	NSL	Low	5.7	6.6	0.8	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor							0	60
white mulberry	Morus alba	NSL	FIA	5	6.3	1.6	Unknown	Unknown	NA	Rare	NNIS	NNIS							0	61
cucumbertree	Magnolia acuminata	NSL	Low	7.7	5.4	0.9	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor							2	62
swamp white oak	Quercus bicolor	NSL	Low	6.1	5.1	2.0	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor							0	63
ailanthus	Ailanthus altissima	NSL	FIA	1	3.1	3.0	Unknown	Unknown	NA	Rare	NNIS	NNIS							0	64
bur oak	Quercus macrocarpa	NDH	Medium	8	1.9	1.5	Lg. dec.	Lg. dec.	High	Rare	Poor	Poor							0	65
American basswood	Tilia americana	WSL	Medium	2	0.7	0.3	Very Lg. dec.	Very Lg. dec.	Medium	Rare	Lost	Lost							0	66
wild plum	Prunus americana	NSLX	FIA	0.5	0.5	0.2	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only							0	67
Osage-orange	Maclura pomifera	NDH	Medium	3.8	0.5	1.9	Lg. inc.	Lg. inc.	High	Rare	Good	Good							2	68
nuttall oak	Quercus texana	NSH	Medium	1	0.2	0.2	Lg. inc.	Lg. inc.	High	Rare	Good	Good							0	69
Ohio buckeye	Aesculus glabra	NSL	Low	2.6	0.1	0.3	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor							0	70
ashe juniper	Juniperus ashei	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat							0	71
slash pine	Pinus elliottii	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat							3	72
Virginia pine	Pinus virginiana	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Likely +	Likely +					3	73
florida maple	Acer barbatum	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +	Migrate +					3	74
striped maple	Acer pensylvanicum	NSL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat							3	75
mountain maple	Acer spicatum	NSL	Low	0	0	0	Unknown	Unknown	High	Absent	Unknown	Unknown							0	76
cittamwood/gum bumelia	Sideroxylon lanuginosum ssp.	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat							3	77
water hickory	Carya aquatica	NSL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +					3	78
black ash	Fraxinus nigra	WSH	Medium	0	0	0	Unknown	Unknown	Low	Absent	Unknown	Unknown							0	79
sweetbay	Magnolia virginiana	NSL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat							3	80
sourwood	Oxydendrum arboreum	NDL	High	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat							3	81
water elm	Planera aquatica	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat							3	82
pin cherry	Prunus pensylvanica	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat							3	83
water oak	Quercus nigra	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate ++	Migrate ++					3	84
willow oak	Quercus phellos	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Likely +	Likely +					3	85
live oak	Quercus virginiana	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat							0	86
cedar elm	Ulmus crassifolia	NDH	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat							3	87