

	sq. km	sq. mi	FIA Plots
Area of Region	24,931	9,626.0	537

**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	4			High	14	19	Increase	15	19	Very Good	7	8	Likely	0	0
Hickory	5			Medium	37	53	No Change	14	14	Good	9	12	Infill	9	13
Maple	2	Abundant	5	Low	33	14	Decrease	30	26	Fair	8	6	Migrate	1	3
Oak	12	Common	17	FIA	5		New	8	11	Poor	15	13			
Pine	6	Rare	42				Unknown	22	19	Very Poor	20	19			
Other	35	Absent	22							FIA Only	5	5			
	<b>64</b>		<b>86</b>		<b>89</b>	<b>86</b>		<b>89</b>	<b>89</b>	Unknown	17	14			
											<b>81</b>	<b>77</b>			

**Potential Changes in Climate Variables**

**Temperature (°F)**

Scenario	2009	2039	2069	2099	
Annual	70.6	72.1	73.6	73.6	
Average	70.6	72.2	74.4	76.6	
GFDL45	70.6	73.6	74.8	75.6	
GFDL85	70.6	72.9	75.8	79.2	
HAD45	70.6	72.3	74.6	75.9	
HAD85	70.6	72.9	75.5	79.1	
Growing Season	79.9	81.1	82.3	82.5	
May—Sep	79.9	81.1	83.3	85.8	
GFDL45	79.9	82.8	83.9	84.9	
GFDL85	79.9	82.3	85.1	88.7	
HAD45	79.9	82.3	84.2	85.5	
HAD85	79.9	82.7	86.0	89.3	
Coldest Month	55.7	57.9	58.8	58.5	
Average	55.7	57.4	58.4	59.8	
GFDL45	55.7	58.4	58.8	59.3	
GFDL85	55.7	58.0	59.1	60.1	
HAD45	55.7	55.5	56.8	57.5	
HAD85	55.7	56.3	57.1	59.0	
Warmest Month	82.1	83.4	84.1	84.2	
Average	82.1	83.4	84.7	86.2	
GFDL45	82.1	84.3	85.2	85.9	
GFDL85	82.1	84.5	85.9	87.9	
HAD45	82.1	84.8	85.6	86.3	
HAD85	82.1	84.8	86.8	88.2	

**Precipitation (in)**

Scenario	2009	2039	2069	2099	
Annual	51.0	54.6	56.0	57.2	
Total	51.0	53.7	55.1	55.0	
GFDL45	51.0	59.2	60.8	63.1	
GFDL85	51.0	55.4	63.6	60.4	
HAD45	51.0	50.3	50.2	52.8	
HAD85	51.0	48.7	48.7	47.7	
Growing Season	30.7	33.2	33.0	33.7	
May—Sep	30.7	32.1	33.4	32.2	
GFDL45	30.7	35.9	36.6	37.0	
GFDL85	30.7	34.4	38.8	36.9	
HAD45	30.7	30.4	30.2	28.9	
HAD85	30.7	28.5	25.9	25.2	

**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>.

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
slash pine	Pinus elliottii	NDH	High	56.9	2321.1	22.4	No change	No change	Medium	Abundant	Good	Good			1	1
laurel oak	Quercus laurifolia	NDH	Medium	66.2	1107.3	11.8	No change	No change	Medium	Abundant	Good	Good			1	2
live oak	Quercus virginiana	NDH	High	58.2	849.5	10.7	Sm. inc.	Lg. inc.	Medium	Abundant	Very Good	Very Good			1	3
longleaf pine	Pinus palustris	NSH	Medium	35.2	695.1	15.2	Sm. inc.	Sm. inc.	Medium	Abundant	Very Good	Very Good			1	4
sand pine	Pinus clausa	NDH	High	16.3	635.3	28.2	No change	No change	Low	Abundant	Fair	Fair			0	5
pond cypress	Taxodium ascendens	NSH	Medium	13.3	436.6	10.1	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	6
loblolly pine	Pinus taeda	WDH	High	20.1	429.4	11.7	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	7
water oak	Quercus nigra	WDH	High	33.5	423.5	6.8	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	8
red maple	Acer rubrum	WDH	High	34.1	361.7	6.2	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good			1	9
sweetgum	Liquidambar styraciflua	WDH	High	30.5	308.0	5.5	No change	No change	Medium	Common	Fair	Fair			1	10
turkey oak	Quercus laevis	NSH	Medium	23.7	265.8	10.2	Sm. dec.	Sm. dec.	High	Common	Fair	Fair			1	11
cabbage palmetto	Sabal palmetto	NDH	Medium	20.5	263.4	7.8	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			0	12
swamp tupelo	Nyssa biflora	NDH	Medium	26.2	226.2	4.0	Lg. inc.	Lg. inc.	Low	Common	Good	Good			1	13
loblolly-bay	Gordonia lasianthus	NSH	Medium	17	152.7	5.4	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	14
bald cypress	Taxodium distichum	NSH	Medium	15.8	144.9	6.1	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	15
black cherry	Prunus serotina	WDL	Medium	26.5	128.3	3.8	Sm. inc.	Sm. inc.	Low	Common	Fair	Fair			1	16
sweetbay	Magnolia virginiana	NSL	Medium	23.1	90.2	3.4	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	17
redbay	Persea borbonia	NSL	Low	26.3	76.7	2.0	No change	Sm. inc.	High	Common	Good	Very Good			1	18
pignut hickory	Carya glabra	WDL	Medium	11.3	67.6	4.3	Sm. dec.	Sm. dec.	Medium	Common	Poor	Poor			0	19
bluejack oak	Quercus incana	NSL	Low	11.5	60.4	4.4	Sm. dec.	No change	Medium	Common	Poor	Fair			1	20
pond pine	Pinus serotina	NSH	Medium	5.1	58.5	8.5	No change	No change	Low	Common	Poor	Poor	Infill +	Infill +	0	21
pumpkin ash	Fraxinus profunda	NSH	FIA	6.8	50.1	6.0	Unknown	Unknown	NA	Common	FIA Only	FIA Only			0	22
American elm	Ulmus americana	WDH	Medium	16.6	46.6	2.0	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	1	23
American hornbeam; muscle	Carpinus caroliniana	WSL	Low	9.7	44.9	2.9	No change	No change	Medium	Rare	Poor	Poor			1	24
southern magnolia	Magnolia grandiflora	NSL	Low	7.5	35.0	2.9	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	1	25
green ash	Fraxinus pennsylvanica	WSH	Low	3.3	31.6	5.1	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	1	26
post oak	Quercus stellata	WDH	High	6.4	31.4	3.2	No change	Sm. inc.	High	Rare	Fair	Good	Infill +	Infill ++	2	27
common persimmon	Diospyros virginiana	NSL	Low	5.2	26.9	2.8	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor			1	28
blackgum	Nyssa sylvatica	WDL	Medium	8.5	24.8	1.8	Sm. inc.	Sm. inc.	High	Rare	Good	Good	Infill ++	Infill ++	1	29
eastern cottonwood	Populus deltoides	NSH	Low	0.4	20.1	50.0	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	30
mockernut hickory	Carya alba	WDL	Medium	3.6	18.0	4.4	No change	No change	High	Rare	Fair	Fair	Infill +	Infill +	2	31
water tupelo	Nyssa aquatica	NSH	Medium	1.2	17.7	6.1	Sm. dec.	Sm. dec.	Low	Rare	Very Poor	Very Poor			0	32
sugarberry	Celtis laevigata	NDH	Medium	4.4	11.4	2.1	Sm. inc.	Lg. inc.	Medium	Rare	Fair	Good	Infill +	Infill ++	2	33
Carolina ash	Fraxinus caroliniana	NSL	FIA	6	11.2	2.1	Unknown	Unknown	NA	Rare	FIA Only	FIA Only			0	34
American holly	Ilex opaca	NSL	Medium	5.6	9.9	0.9	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	35
southern red oak	Quercus falcata	WDL	Medium	2.4	9.7	3.3	No change	Sm. inc.	High	Rare	Fair	Good	Infill +	Infill ++	2	36
eastern redcedar	Juniperus virginiana	WDH	Medium	3.1	8.5	1.6	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			2	37
river birch	Betula nigra	NSL	Low	1.1	7.7	6.3	No change	No change	Medium	Rare	Poor	Poor		Infill +	2	38
eastern hophornbeam; ironw	Ostrya virginiana	WSL	Low	1.4	6.2	1.9	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor		Infill +	2	39
flowering dogwood	Cornus florida	WDL	Medium	3.4	5.9	1.3	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			2	40
sand hickory	Carya pallida	NSL	FIA	0.8	4.9	6.1	Unknown	Unknown	NA	Rare	FIA Only	FIA Only			0	41
swamp chestnut oak	Quercus michauxii	NSL	Low	1.8	4.6	1.5	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	42
florida maple	Acer barbatum	NSL	Low	0.9	4.3	3.0	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor			0	43
blackjack oak	Quercus marilandica	NSL	Medium	0.7	4.1	1.3	Lg. dec.	Sm. dec.	High	Rare	Poor	Poor		Infill +	2	44
winged elm	Ulmus alata	WDL	Medium	2.6	4.0	0.9	No change	No change	Medium	Rare	Poor	Poor		Infill +	2	45
spruce pine	Pinus glabra	NSL	Low	0.9	3.7	2.2	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	46
water hickory	Carya aquatica	NSL	Medium	1.4	3.3	2.0	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	47

Section 232K

EcoMap 2007  
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 mulberry	Morus rubra	NSL	Low	1.1	3.2	2.3	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor				0 48
pecan	Carya illinoensis	NSH	Low	0.8	2.5	3.1	Sm. dec.	No change	Low	Rare	Very Poor	Very Poor				2 49
overcup oak	Quercus lyrata	NSL	Medium	0.2	1.9	2.3	Sm. dec.	Sm. dec.	Low	Rare	Very Poor	Very Poor				0 50
American basswood	Tilia americana	WSL	Medium	0.3	1.9	1.4	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor				0 51
American beech	Fagus grandifolia	WDH	High	0.7	1.8	2.1	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor				0 52
white ash	Fraxinus americana	WDL	Medium	0.4	1.7	4.0	Sm. dec.	Sm. dec.	Low	Rare	Very Poor	Very Poor				0 53
hackberry	Celtis occidentalis	WDH	Medium	1.3	1.7	0.9	Lg. dec.	Very Lg. dec.	High	Rare	Poor	Lost				0 54
honeylocust	Gleditsia triacanthos	NSH	Low	0.4	1.3	3.2	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor				0 55
Shumard oak	Quercus shumardii	NSL	Low	0	0.8	0.2	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor				0 56
waterlocust	Gleditsia aquatica	NSLX	FIA	0.9	0.8	1.2	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only				0 57
black willow	Salix nigra	NSH	Low	1.6	0.4	3.5	Sm. dec.	No change	Low	Rare	Very Poor	Very Poor				2 58
cucumbertree	Magnolia acuminata	NSL	Low	0.4	0.3	0.7	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor				0 59
eastern redbud	Cercis canadensis	NSL	Low	0.3	0.2	0.3	Sm. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor				0 60
wild plum	Prunus americana	NSLX	FIA	0.2	0.1	0.2	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only				0 61
pawpaw	Asimina triloba	NSL	Low	0.4	0.1	0.3	Sm. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor				0 62
sassafras	Sassafras albidum	WSL	Low	0.4	0.1	0.3	Lg. dec.	Lg. inc.	Medium	Rare	Very Poor	Good				2 63
willow oak	Quercus phellos	NSL	Low	0.3	0.1	0.1	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor				0 64
Atlantic white-cedar	Chamaecyparis thyoides	NSH	Low	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat				3 65
shortleaf pine	Pinus echinata	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +		3 66
Virginia pine	Pinus virginiana	NDH	High	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown				0 67
boxelder	Acer negundo	WSH	Low	0	0	0	Unknown	Unknown	High	Modeled	Unknown	Unknown				0 68
striped maple	Acer pensylvanicum	NSL	Medium	0	0	0	Unknown	New Habitat	Medium	Absent	Unknown	New Habitat				0 69
serviceberry	Amelanchier spp.	NSL	Low	0	0	0	Unknown	New Habitat	Medium	Absent	Unknown	New Habitat				3 70
sweet birch	Betula lenta	NDH	High	0	0	0	Unknown	Unknown	Low	Absent	Unknown	Unknown				0 71
gray birch	Betula populifolia	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown				0 72
shagbark hickory	Carya ovata	WSL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat				3 73
black hickory	Carya texana	NDL	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat				3 74
black ash	Fraxinus nigra	WSH	Medium	0	0	0	Unknown	New Habitat	Low	Absent	Unknown	New Habitat				0 75
silverbell	Halesia spp.	NSL	Low	0	0	0	New Habitat	Unknown	Medium	Absent	New Habitat	Unknown				3 76
Osage-orange	Maclura pomifera	NDH	Medium	0	0	0	Unknown	Unknown	High	Absent	Unknown	Unknown				0 77
bigleaf magnolia	Magnolia macrophylla	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown				0 78
sourwood	Oxydendrum arboreum	NDL	High	0	0	0	Unknown	Unknown	High	Absent	Unknown	Unknown				0 79
water elm	Planera aquatica	NSL	Low	0	0	0	Unknown	Unknown	Medium	Modeled	Unknown	Unknown				0 80
sycamore	Platanus occidentalis	NSL	Low	0	0	0	Unknown	Unknown	Medium	Modeled	Unknown	Unknown				0 81
pin cherry	Prunus pensylvanica	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown				0 82
white oak	Quercus alba	WDH	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat		Migrate +		3 83
scarlet oak	Quercus coccinea	WDL	Medium	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown				0 84
cherrybark oak; swamp red o.	Quercus pagoda	NSL	Medium	0	0	0	Unknown	New Habitat	Medium	Absent	Unknown	New Habitat				3 85
Nuttall oak	Quercus texana	NSH	Medium	0	0	0	Unknown	Unknown	High	Absent	Unknown	Unknown				0 86
black locust	Robinia pseudoacacia	NDH	Low	0	0	0	New Habitat	Unknown	Medium	Absent	New Habitat	Unknown				3 87
American mountain-ash	Sorbus americana	NSL	Low	0	0	0	Unknown	New Habitat	Low	Absent	Unknown	New Habitat				0 88
cedar elm	Ulmus crassifolia	NDH	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat		Migrate ++		3 89

