

	sq. km	sq. mi	FIA Plots
Area of Region	12,356	4,770.5	201

**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	Scenario	Scenario	Scenario	SHIFT	SHIFT				
				High	24	RCP45	RCP85	RCP45	RCP85	RCP45	RCP85				
Ash	3					Increase	15	21	Very Good	1	5	Likely	0	0	
Hickory	6			Medium	34	50	No Change	27	24	Good	17	15	Infill	27	29
Maple	6	Abundant	4	Low	36	10	Decrease	29	26	Fair	9	12	Migrate	2	2
Oak	17	Common	14	FIA	2		New	6	6	Poor	27	23			
Pine	4	Rare	55				Unknown	8	8	Very Poor	15	12			
Other	37	Absent	9							FIA Only	1	1			
	<b>73</b>		<b>82</b>		<b>85</b>	<b>84</b>		<b>85</b>	<b>85</b>	Unknown	6	6			
											<b>76</b>	<b>74</b>			

**Potential Changes in Climate Variables**

**Temperature (°F)**

	Scenario	2009	2039	2069	2099	
Annual Average	CCSM45	67.5	69.0	70.7	70.9	
	CCSM85	67.5	69.3	71.6	73.8	
	GFDL45	67.5	70.9	71.6	72.5	
	GFDL85	67.5	69.9	72.9	76.2	
	HAD45	67.5	69.7	72.4	73.4	
HAD85	67.5	70.0	73.4	76.9		
Growing Season (May—Sep)	CCSM45	79.4	80.7	81.9	82.3	
	CCSM85	79.4	80.9	83.0	85.5	
	GFDL45	79.4	83.3	83.6	85.4	
	GFDL85	79.4	82.2	85.3	89.2	
	HAD45	79.4	82.2	84.6	85.2	
HAD85	79.4	82.3	86.7	89.7		
Coldest Month (Average)	CCSM45	49.2	51.5	52.4	52.4	
	CCSM85	49.2	51.9	53.1	54.3	
	GFDL45	49.2	52.5	52.6	52.6	
	GFDL85	49.2	50.4	51.3	52.0	
	HAD45	49.2	49.9	51.6	52.4	
HAD85	49.2	51.3	52.5	54.4		
Warmest Month (Average)	CCSM45	82.7	83.8	84.1	84.3	
	CCSM85	82.7	84.0	84.8	86.2	
	GFDL45	82.7	86.1	86.0	87.4	
	GFDL85	82.7	85.8	87.1	89.5	
	HAD45	82.7	86.0	87.2	87.3	
HAD85	82.7	86.3	88.8	89.8		

**Precipitation (in)**

	Scenario	2009	2039	2069	2099	
Annual Total	CCSM45	61.1	63.3	69.2	66.5	
	CCSM85	61.1	63.3	65.9	67.2	
	GFDL45	61.1	66.2	74.2	67.2	
	GFDL85	61.1	65.1	66.4	66.8	
	HAD45	61.1	59.5	61.1	64.9	
HAD85	61.1	64.6	57.8	61.9		
Growing Season (May—Sep)	CCSM45	26.1	27.0	28.6	27.8	
	CCSM85	26.1	25.5	26.5	26.0	
	GFDL45	26.1	29.8	35.4	29.9	
	GFDL85	26.1	29.6	31.5	32.9	
	HAD45	26.1	26.0	26.0	27.1	
HAD85	26.1	25.8	22.4	23.0		

**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>.

Section 234C

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
bald cypress	Taxodium distichum	NSH	Medium	53	848.4	15.8	No change	No change	Medium	Abundant	Good	Good			1	1
sugarberry	Celtis laevigata	NDH	Medium	67.4	725.2	10.7	No change	No change	Medium	Abundant	Good	Good			1	2
green ash	Fraxinus pennsylvanica	WSH	Low	67.6	587.1	10.0	No change	No change	Medium	Abundant	Good	Good			1	3
sweetgum	Liquidambar styraciflua	WDH	High	57.9	506.0	9.7	No change	No change	Medium	Abundant	Good	Good			1	4
loblolly pine	Pinus taeda	WDH	High	10.4	428.8	30.5	Sm. inc.	Lg. inc.	Medium	Common	Good	Very Good	Infill ++	Infill ++	1	5
red maple	Acer rubrum	WDH	High	60.2	406.7	6.3	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good			1	6
water tupelo	Nyssa aquatica	NSH	Medium	29.6	368.9	12.0	No change	No change	Low	Common	Poor	Poor	Infill +	Infill +	0	7
black willow	Salix nigra	NSH	Low	34.8	328.5	9.7	No change	Sm. inc.	Low	Common	Poor	Fair			1	8
water oak	Quercus nigra	WDH	High	43	264.8	8.4	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	9
American elm	Ulmus americana	WDH	Medium	56.2	243.6	5.4	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	10
water hickory	Carya aquatica	NSL	Medium	43.9	197.4	5.2	No change	No change	Medium	Common	Fair	Fair			1	11
Nuttall oak	Quercus texana	NSH	Medium	39.8	175.8	5.5	No change	Sm. inc.	High	Common	Good	Very Good			0	12
boxelder	Acer negundo	WSH	Low	26.8	160.4	5.2	No change	Sm. inc.	High	Common	Good	Very Good			1	13
sycamore	Platanus occidentalis	NSL	Low	17.8	155.6	7.1	Sm. dec.	Sm. dec.	Medium	Common	Poor	Poor	Infill +	Infill +	0	14
overcup oak	Quercus lyrata	NSL	Medium	34.9	141.8	5.5	Sm. inc.	Lg. inc.	Low	Common	Fair	Good			1	15
eastern cottonwood	Populus deltoides	NSH	Low	13.2	65.6	4.0	Sm. dec.	No change	Medium	Common	Poor	Fair	Infill +	Infill +	1	16
pecan	Carya illinoensis	NSH	Low	19.3	59.7	3.6	Lg. inc.	Lg. inc.	Low	Common	Good	Good	Infill ++	Infill ++	1	17
honeylocust	Gleditsia triacanthos	NSH	Low	22.7	57.1	2.7	No change	Sm. inc.	High	Common	Good	Very Good	Infill ++	Infill ++	1	18
willow oak	Quercus phellos	NSL	Low	13.7	46.5	6.0	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	1	19
common persimmon	Diospyros virginiana	NSL	Low	18.8	45.0	2.0	Lg. dec.	Sm. dec.	High	Rare	Poor	Poor			1	20
swamp tupelo	Nyssa biflora	NDH	Medium	7.3	43.6	4.6	Sm. dec.	Sm. dec.	Low	Rare	Very Poor	Very Poor			0	21
slash pine	Pinus elliotii	NDH	High	1.7	41.0	10.1	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	22
swamp chestnut oak	Quercus michauxii	NSL	Low	10.9	40.8	4.4	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	1	23
winged elm	Ulmus alata	WDL	Medium	28.6	40.6	2.1	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			1	24
slippery elm	Ulmus rubra	WSL	Low	22.5	40.0	2.0	Sm. inc.	Lg. inc.	Medium	Rare	Fair	Good			1	25
cherrybark oak; swamp red o	Quercus pagoda	NSL	Medium	18.8	40.0	4.1	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	1	26
southern red oak	Quercus falcata	WDL	Medium	14.5	39.1	3.2	Sm. inc.	Sm. inc.	High	Rare	Good	Good	Infill ++	Infill ++	1	27
water elm	Planera aquatica	NSL	Low	13.9	33.2	2.7	Sm. dec.	Sm. inc.	Medium	Rare	Very Poor	Fair		Infill +	1	28
American hornbeam; musclev	Carpinus caroliniana	WSL	Low	18.2	33.1	2.7	Sm. inc.	Sm. inc.	Medium	Rare	Fair	Fair			1	29
longleaf pine	Pinus palustris	NSH	Medium	4.3	32.9	7.0	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	30
live oak	Quercus virginiana	NDH	High	9.6	30.8	4.1	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	31
blackgum	Nyssa sylvatica	WDL	Medium	15.8	28.7	1.9	No change	No change	High	Rare	Fair	Fair	Infill +	Infill +	1	32
white oak	Quercus alba	WDH	Medium	6.4	28.1	3.0	No change	No change	High	Rare	Fair	Fair	Infill +	Infill +	2	33
flowering dogwood	Cornus florida	WDL	Medium	20.3	27.0	1.7	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	34
bitternut hickory	Carya cordiformis	WSL	Low	9.8	18.8	3.1	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor	Infill +	Infill +	2	35
mockernut hickory	Carya alba	WDL	Medium	6.3	18.3	2.6	No change	No change	High	Rare	Fair	Fair	Infill +	Infill +	2	36
American beech	Fagus grandifolia	WDH	High	8.6	16.4	1.4	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	37
waterlocust	Gleditsia aquatica	NSLX	FIA	10.1	10.8	2.0	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	38
eastern hophornbeam; ironw	Ostrya virginiana	WSL	Low	10.1	10.7	1.3	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor	Infill +	Infill +	1	39
post oak	Quercus stellata	WDH	High	7	10.4	1.6	Sm. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	Infill ++	2	40
laurel oak	Quercus laurifolia	NDH	Medium	6.1	9.7	1.3	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	1	41
black cherry	Prunus serotina	WDL	Medium	10.4	9.3	0.8	Sm. dec.	Sm. dec.	Low	Rare	Very Poor	Very Poor			0	42
pignut hickory	Carya glabra	WDL	Medium	7.2	8.9	1.5	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			2	43
white ash	Fraxinus americana	WDL	Medium	2.7	7.5	2.2	Sm. dec.	No change	Low	Rare	Very Poor	Very Poor			2	44
yellow-poplar	Liriodendron tulipifera	WDH	High	1	7.4	3.6	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor	Infill +		2	45
cedar elm	Ulmus crassifolia	NDH	Medium	2.8	7.1	2.1	Lg. inc.	Lg. inc.	Low	Rare	Fair	Fair	Infill +	Infill +	2	46
Shumard oak	Quercus shumardii	NSL	Low	0.8	5.8	7.2	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor		Infill +	2	47



Section 234C

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
blackjack oak	Quercus marilandica	NSL	Medium	0.8	5.5	6.8	No change	No change	High	Rare	Fair	Fair	Infill +	Infill +	2	48
shortleaf pine	Pinus echinata	WDH	High	1.7	5.2	3.2	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	49
red mulberry	Morus rubra	NSL	Low	9.8	5.2	1.1	No change	No change	Medium	Rare	Poor	Poor			0	50
southern magnolia	Magnolia grandiflora	NSL	Low	5.2	4.9	0.9	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	51
eastern redbud	Cercis canadensis	NSL	Low	0.8	4.8	5.9	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	52
black locust	Robinia pseudoacacia	NDH	Low	4.2	3.3	3.4	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	53
redbay	Persea borbonia	NSL	Low	2.7	3.0	2.5	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor			0	54
shagbark hickory	Carya ovata	WSL	Medium	5	1.9	1.3	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	55
florida maple	Acer barbatum	NSL	Low	1.6	1.9	1.1	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor			0	56
sugar maple	Acer saccharum	WDH	High	0.8	1.7	2.1	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor			0	57
American holly	Ilex opaca	NSL	Medium	6.4	1.5	0.4	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	58
northern red oak	Quercus rubra	WDH	Medium	0.7	1.3	1.4	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor			0	59
hackberry	Celtis occidentalis	WDH	Medium	4.5	1.1	0.6	Very Lg. dec.	No change	High	Rare	Lost	Fair		Infill +	2	60
sassafras	Sassafras albidum	WSL	Low	3	1.1	0.4	Sm. dec.	Very Lg. dec.	Medium	Rare	Very Poor	Lost			2	61
bigleaf magnolia	Magnolia macrophylla	NSL	Low	1	1.0	0.3	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	62
blue ash	Fraxinus quadrangulata	NSL	Low	0.8	0.9	1.1	Sm. dec.	Sm. dec.	Low	Rare	Very Poor	Very Poor			0	63
black oak	Quercus velutina	WDH	High	2.6	0.6	0.4	Lg. dec.	Very Lg. dec.	Medium	Rare	Very Poor	Lost			0	64
chinkapin oak	Quercus muehlenbergii	NSL	Medium	0.8	0.5	0.7	Lg. dec.	Very Lg. dec.	Medium	Rare	Very Poor	Lost			0	65
eastern redcedar	Juniperus virginiana	WDH	Medium	0.8	0.5	0.6	Very Lg. dec.	Very Lg. dec.	Medium	Rare	Lost	Lost			2	66
pin cherry	Prunus pensylvanica	NSL	Low	0.8	0.4	0.5	No change	No change	Medium	Rare	Poor	Poor			0	67
silver maple	Acer saccharinum	NSH	Low	0.8	0.4	0.4	Lg. dec.	Lg. dec.	High	Rare	Poor	Poor			0	68
striped maple	Acer pensylvanicum	NSL	Medium	0.8	0.3	0.3	No change	No change	Medium	Rare	Poor	Poor			0	69
sweetbay	Magnolia virginiana	NSL	Medium	0.8	0.3	0.3	No change	Sm. inc.	Medium	Rare	Poor	Fair	Infill +	Infill +	2	70
scarlet oak	Quercus coccinea	WDL	Medium	0.2	0.3	0.1	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	71
American basswood	Tilia americana	WSL	Medium	3.2	0.2	0.9	No change	Lg. dec.	Medium	Rare	Poor	Very Poor			0	72
white mulberry	Morus alba	NSL	FIA	3.3	0.1	0.2	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	73
Atlantic white-cedar	Chamaecyparis thyoides	NSH	Low	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat	Migrate +		3	74
spruce pine	Pinus glabra	NSL	Low	0	0	0	Unknown	Unknown	Medium	Modeled	Unknown	Unknown			0	75
black maple	Acer nigrum	NSH	Low	0	0	0	Unknown	Unknown	High	Modeled	Unknown	Unknown			0	76
mountain maple	Acer spicatum	NSL	Low	0	0	0	Unknown	Unknown	High	Absent	Unknown	Unknown			0	77
serviceberry	Amelanchier spp.	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	78
pawpaw	Asimina triloba	NSL	Low	0	0	0	New Habitat	Unknown	Medium	Absent	New Habitat	Unknown			3	79
cittamwood/gum bumelia	Sideroxylon lanuginosum ssp.	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	80
black hickory	Carya texana	NDL	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +	3	81
loblolly-bay	Gordonia lasianthus	NSH	Medium	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	82
silverbell	Halesia spp.	NSL	Low	0	0	0	Unknown	New Habitat	Medium	Absent	Unknown	New Habitat			3	83
swamp white oak	Quercus bicolor	NSL	Low	0	0	0	Unknown	Unknown	Medium	Modeled	Unknown	Unknown			0	84
cabbage palmetto	Sabal palmetto	NDH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			0	85

