

Current and Potential Future Habitat, Capability, and Migration

	sq. km	sq. mi	FIA Plots
Area of Region	12,905	4,982.8	208

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	13	22	Increase	29	32	Very Good	13	14	Likely	0	0
Hickory	7			Medium	32	48	No Change	15	15	Good	14	17	Infill	25	26
Maple	4	Abundant	2	Low	33	10	Decrease	16	13	Fair	13	9	Migrate	5	5
Oak	14	Common	31	FIA	2		New	11	11	Poor	10	12			
Pine	2	Rare	29				Unknown	9	9	Very Poor	10	8			
Other	33	Absent	16							FIA Only	2	2			
	<b>62</b>		<b>78</b>		<b>80</b>	<b>80</b>		<b>80</b>	<b>80</b>	Unknown	7	7			
											<b>69</b>	<b>69</b>			

Potential Changes in Climate Variables

Temperature (°F)

	Scenario	2009	2039	2069	2099	
Annual Average	CCSM45	62.6	64.2	66.2	66.5	
	CCSM85	62.6	64.6	67.1	69.8	
	GFDL45	62.6	66.7	67.2	68.2	
	GFDL85	62.6	65.4	68.4	71.9	
	HAD45	62.6	65.1	68.0	69.3	
	HAD85	62.6	65.4	69.9	73.6	
Growing Season May—Sep	CCSM45	77.3	78.9	80.4	81.0	
	CCSM85	77.3	79.4	81.8	85.2	
	GFDL45	77.3	82.4	82.6	84.5	
	GFDL85	77.3	80.9	84.2	88.7	
	HAD45	77.3	80.6	83.4	84.5	
	HAD85	77.3	80.9	87.2	90.5	
Coldest Month Average	CCSM45	40.2	42.5	43.6	43.8	
	CCSM85	40.2	42.6	43.8	45.3	
	GFDL45	40.2	44.0	44.2	44.3	
	GFDL85	40.2	41.5	42.8	43.4	
	HAD45	40.2	41.3	43.1	43.5	
	HAD85	40.2	42.4	44.0	45.7	
Warmest Month Average	CCSM45	82.5	83.9	84.9	85.0	
	CCSM85	82.5	84.7	85.5	87.3	
	GFDL45	82.5	87.1	87.4	88.7	
	GFDL85	82.5	86.5	88.1	91.1	
	HAD45	82.5	86.8	88.6	88.8	
	HAD85	82.5	87.6	91.4	92.5	

Precipitation (in)

	Scenario	2009	2039	2069	2099	
Annual Total	CCSM45	50.5	51.5	56.1	54.5	
	CCSM85	50.5	52.9	55.8	57.8	
	GFDL45	50.5	55.2	60.7	57.9	
	GFDL85	50.5	54.9	58.9	60.7	
	HAD45	50.5	48.8	52.8	55.9	
	HAD85	50.5	53.5	46.9	52.2	
Growing Season May—Sep	CCSM45	17.3	16.9	17.3	17.3	
	CCSM85	17.3	16.4	15.7	16.5	
	GFDL45	17.3	18.9	20.8	20.2	
	GFDL85	17.3	19.9	21.4	21.4	
	HAD45	17.3	15.8	16.3	15.6	
	HAD85	17.3	17.0	12.4	12.7	

**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 234E

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
loblolly pine	Pinus taeda	WDH	High	35.2	1638.1	35.3	No change	No change	Medium	Abundant	Good	Good			1	1
sweetgum	Liquidambar styraciflua	WDH	High	49.7	531.2	8.6	Sm. inc.	Sm. inc.	Medium	Abundant	Very Good	Very Good			1	2
sugarberry	Celtis laevigata	NDH	Medium	36.9	330.4	9.1	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	3
overcup oak	Quercus lyrata	NSL	Medium	37.3	277.6	8.4	Sm. inc.	Sm. inc.	Low	Common	Fair	Fair			1	4
green ash	Fraxinus pennsylvanica	WSH	Low	55.3	275.3	5.5	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	5
water oak	Quercus nigra	WDH	High	39.3	267.2	4.7	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	6
winged elm	Ulmus alata	WDL	Medium	55.1	245.0	4.0	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	7
willow oak	Quercus phellos	NSL	Low	36.4	198.5	3.4	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	8
bald cypress	Taxodium distichum	NSH	Medium	15.1	170.8	9.5	Sm. inc.	Sm. inc.	Medium	Common	Good	Good	Infill ++	Infill ++	1	9
white oak	Quercus alba	WDH	Medium	25.2	170.4	5.0	No change	No change	High	Common	Good	Good	Infill ++	Infill ++	1	10
southern red oak	Quercus falcata	WDL	Medium	37.5	168.5	4.0	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good			1	11
cherrybark oak; swamp red o	Quercus pagoda	NSL	Medium	41.2	167.0	3.6	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	12
boxelder	Acer negundo	WSH	Low	18.8	154.9	5.3	Sm. dec.	Sm. dec.	High	Common	Fair	Fair	Infill +	Infill +	1	13
post oak	Quercus stellata	WDH	High	30.3	147.4	4.7	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good	Infill ++	Infill ++	1	14
water hickory	Carya aquatica	NSL	Medium	32.4	144.9	5.4	Sm. inc.	Sm. inc.	Medium	Common	Good	Good	Infill ++	Infill ++	1	15
black willow	Salix nigra	NSH	Low	19.1	141.0	9.1	Lg. inc.	Lg. inc.	Low	Common	Good	Good	Infill ++	Infill ++	1	16
pecan	Carya illinoensis	NSH	Low	17.9	138.4	10.1	Sm. inc.	Lg. inc.	Low	Common	Fair	Good	Infill +	Infill ++	1	17
common persimmon	Diospyros virginiana	NSL	Low	36	130.0	3.9	No change	No change	High	Common	Good	Good			1	18
mockernut hickory	Carya alba	WDL	Medium	33.3	128.4	4.4	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good			1	19
slippery elm	Ulmus rubra	WSL	Low	43.7	126.1	4.2	Sm. inc.	Lg. inc.	Medium	Common	Good	Very Good			1	20
Nuttall oak	Quercus texana	NSH	Medium	26.5	121.4	5.0	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good			0	21
red maple	Acer rubrum	WDH	High	34.1	107.2	2.6	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good			1	22
American elm	Ulmus americana	WDH	Medium	37.3	89.5	4.1	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	23
water elm	Planera aquatica	NSL	Low	15.8	80.2	8.2	No change	Sm. inc.	Medium	Common	Fair	Good	Infill +	Infill ++	1	24
shagbark hickory	Carya ovata	WSL	Medium	19.6	79.0	5.6	Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor	Infill +	Infill +	0	25
honeylocust	Gleditsia triacanthos	NSH	Low	24.6	72.1	3.9	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good	Infill ++	Infill ++	1	26
black hickory	Carya texana	NDL	High	17.1	68.9	3.8	No change	Sm. inc.	Medium	Common	Fair	Good	Infill +	Infill ++	1	27
blackgum	Nyssa sylvatica	WDL	Medium	20.8	58.0	2.3	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good	Infill ++	Infill ++	1	28
black cherry	Prunus serotina	WDL	Medium	19.3	55.7	1.5	No change	No change	Low	Common	Poor	Poor			0	29
sycamore	Platanus occidentalis	NSL	Low	10.7	55.0	6.6	Sm. dec.	Sm. dec.	Medium	Common	Poor	Poor	Infill +	Infill +	2	30
eastern cottonwood	Populus deltoides	NSH	Low	5.9	52.3	6.0	No change	No change	Medium	Common	Fair	Fair	Infill +	Infill +	1	31
American hornbeam; musclev	Carpinus caroliniana	WSL	Low	15.8	51.6	2.9	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	32
shortleaf pine	Pinus echinata	WDH	High	4.7	51.5	2.4	No change	No change	Medium	Common	Fair	Fair	Infill +	Infill +	1	33
Shumard oak	Quercus shumardii	NSL	Low	13	43.2	8.2	No change	Sm. inc.	High	Rare	Fair	Good	Infill +	Infill ++	1	34
silver maple	Acer saccharinum	NSH	Low	3.1	42.0	5.1	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor			0	35
water tupelo	Nyssa aquatica	NSH	Medium	6.8	38.0	7.9	Sm. dec.	No change	Low	Rare	Very Poor	Very Poor			2	36
sassafras	Sassafras albidum	WSL	Low	9.7	31.6	3.8	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	37
waterlocust	Gleditsia aquatica	NSLX	FIA	19	24.9	3.2	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	38
black oak	Quercus velutina	WDH	High	8.5	21.7	3.1	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	39
pignut hickory	Carya glabra	WDL	Medium	6	21.1	2.0	Sm. dec.	No change	Medium	Rare	Very Poor	Poor		Infill +	2	40
cedar elm	Ulmus crassifolia	NDH	Medium	17.2	20.8	4.5	Lg. inc.	Lg. inc.	Low	Rare	Fair	Fair	Infill +	Infill +	2	41
eastern redcedar	Juniperus virginiana	WDH	Medium	4.7	19.3	3.2	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	42
red mulberry	Morus rubra	NSL	Low	6.7	18.0	2.3	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	43
eastern hophornbeam; ironw	Ostrya virginiana	WSL	Low	6.4	17.8	1.3	No change	No change	High	Rare	Fair	Fair	Infill +	Infill +	1	44
swamp chestnut oak	Quercus michauxii	NSL	Low	9.8	16.1	3.1	Sm. inc.	Sm. inc.	Medium	Rare	Fair	Fair	Infill +	Infill +	2	45
white ash	Fraxinus americana	WDL	Medium	8.5	16.1	2.3	No change	No change	Low	Rare	Very Poor	Very Poor			2	46
hackberry	Celtis occidentalis	WDH	Medium	4.6	12.9	2.3	No change	No change	High	Rare	Fair	Fair	Infill +	Infill +	2	47



Section 234E

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	6.1	11.5	2.6	Lg. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	Infill ++	2	48
flowering dogwood	Cornus florida	WDL	Medium	15.5	11.5	0.7	Sm. inc.	Sm. inc.	Medium	Rare	Fair	Fair			1	49
northern red oak	Quercus rubra	WDH	Medium	4	11.3	2.3	Lg. dec.	Lg. dec.	High	Rare	Poor	Poor			0	50
American holly	Ilex opaca	NSL	Medium	4.6	8.3	0.8	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	51
black walnut	Juglans nigra	WDH	Low	0.9	5.8	2.3	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	52
Osage-orange	Maclura pomifera	NDH	Medium	0.8	5.5	7.1	Sm. inc.	Lg. inc.	High	Rare	Good	Good			2	53
florida maple	Acer barbatum	NSL	Low	1.3	4.3	2.7	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor			0	54
pawpaw	Asimina triloba	NSL	Low	0.8	3.6	4.7	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	55
American basswood	Tilia americana	WSL	Medium	0.7	2.6	3.1	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	56
eastern redbud	Cercis canadensis	NSL	Low	4.5	2.1	1.2	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	57
bitternut hickory	Carya cordiformis	WSL	Low	3.8	2.1	0.4	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor	Infill +		2	58
river birch	Betula nigra	NSL	Low	0.8	1.6	2.1	Sm. dec.	No change	Medium	Rare	Very Poor	Poor		Infill +	2	59
laurel oak	Quercus laurifolia	NDH	Medium	0.7	1.5	1.6	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	60
wild plum	Prunus americana	NSLX	FIA	3.8	1.0	1.2	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	61
cittamwood/gum bumelia	Sideroxylon lanuginosum ssp.	NSL	Low	0.8	0.9	1.2	Lg. inc.	Lg. inc.	High	Rare	Good	Good			2	62
Atlantic white-cedar	Chamaecyparis thyoides	NSH	Low	0	0	0	Unknown	Unknown	Low	Absent	Unknown	Unknown			0	63
ashe juniper	Juniperus ashei	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			0	64
slash pine	Pinus elliotii	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate ++	Migrate ++	3	65
longleaf pine	Pinus palustris	NSH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	66
striped maple	Acer pensylvanicum	NSL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	67
serviceberry	Amelanchier spp.	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	68
shellbark hickory	Carya laciniosa	NSL	Low	0	0	0	Unknown	Unknown	Medium	Modeled	Unknown	Unknown			0	69
American beech	Fagus grandifolia	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate ++	Migrate ++	3	70
black ash	Fraxinus nigra	WSH	Medium	0	0	0	Unknown	Unknown	Low	Absent	Unknown	Unknown			0	71
silverbell	Halesia spp.	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	72
southern magnolia	Magnolia grandiflora	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	73
sweetbay	Magnolia virginiana	NSL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate ++	Migrate ++	3	74
bigleaf magnolia	Magnolia macrophylla	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	75
swamp tupelo	Nyssa biflora	NDH	Medium	0	0	0	Unknown	Unknown	Low	Modeled	Unknown	Unknown			0	76
redbay	Persea borbonia	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			3	77
pin cherry	Prunus pensylvanica	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	78
chestnut oak	Quercus prinus	NDH	High	0	0	0	Unknown	Unknown	High	Absent	Unknown	Unknown			0	79
live oak	Quercus virginiana	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	80

