

sq. km    sq. mi    FIA Plots  
Area of Region    82,371    31,804    2,481

**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	20	26	Increase	29	30	Very Good	13	14	Likely	1	1
Ash	3			Medium	37	62	No Change	22	27	Good	12	14	Infill	24	28
Hickory	8			Low	40	15	Decrease	33	27	Fair	14	12	Migrate	1	1
Maple	5	Abundant	6	FIA	11		New	8	7	Poor	19	21			
Oak	19	Common	20				Unknown	16	17	Very Poor	25	22			
Pine	9	Rare	69							FIA Only	8	8			
Other	51	Absent	12							Unknown	5	6			
	<b>95</b>		<b>107</b>		<b>108</b>	<b>103</b>		<b>108</b>	<b>108</b>		<b>96</b>	<b>97</b>		<b>26</b>	<b>30</b>

**Potential Changes in Climate Variables**

**Temperature (°F)**

	Scenario	2009	2039	2069	2099	
Annual Average	CCSM45	64.3	66.0	68.0	68.0	
	CCSM85	64.3	66.2	68.7	71.3	
	GFDL45	64.3	67.1	69.0	69.8	
	GFDL85	64.3	67.0	70.1	73.7	
	HAD45	64.3	66.5	69.2	70.7	
	HAD85	64.3	66.8	70.5	74.5	
Growing Season (May—Sep)	CCSM45	77.2	78.7	80.4	80.8	
	CCSM85	77.2	78.8	81.3	84.6	
	GFDL45	77.2	80.1	82.0	83.2	
	GFDL85	77.2	80.1	83.4	87.4	
	HAD45	77.2	80.3	82.6	84.4	
	HAD85	77.2	80.2	85.5	89.3	
Coldest Month Average	CCSM45	45.0	47.3	48.1	47.9	
	CCSM85	45.0	47.1	48.2	49.4	
	GFDL45	45.0	47.9	48.2	48.7	
	GFDL85	45.0	47.0	48.0	48.7	
	HAD45	45.0	45.2	46.7	47.4	
	HAD85	45.0	46.1	47.0	48.7	
Warmest Month Average	CCSM45	81.5	83.1	84.0	84.3	
	CCSM85	81.5	83.3	84.7	86.5	
	GFDL45	81.5	84.0	84.7	85.6	
	GFDL85	81.5	84.3	85.8	88.1	
	HAD45	81.5	85.1	86.5	87.3	
	HAD85	81.5	85.4	88.6	90.5	

**Precipitation (in)**

	Scenario	2009	2039	2069	2099	
Annual Total	CCSM45	46.1	49.6	51.4	53.3	
	CCSM85	46.1	49.5	53.2	57.9	
	GFDL45	46.1	51.2	54.3	57.1	
	GFDL85	46.1	50.8	56.1	55.2	
	HAD45	46.1	45.0	47.6	48.6	
	HAD85	46.1	48.6	44.8	46.7	
Growing Season (May—Sep)	CCSM45	21.0	24.2	25.2	26.2	
	CCSM85	21.0	23.0	25.6	27.5	
	GFDL45	21.0	25.8	27.8	28.7	
	GFDL85	21.0	25.1	29.5	29.5	
	HAD45	21.0	20.8	21.2	21.1	
	HAD85	21.0	22.1	18.6	18.4	

**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.

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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	88.3	3780.7	32.5	No change	No change	Medium	Abundant	Good	Good			1	1
slash pine	Pinus elliotii	NDH	High	43.9	1149.0	20.4	Sm. inc.	Sm. inc.	Medium	Abundant	Very Good	Very Good			1	2
sweetgum	Liquidambar styraciflua	WDH	High	75.1	885.7	8.7	No change	No change	Medium	Abundant	Good	Good			1	3
water oak	Quercus nigra	WDH	High	81.2	801.5	7.5	Sm. inc.	Sm. inc.	Medium	Abundant	Very Good	Very Good			1	4
red maple	Acer rubrum	WDH	High	69.9	598.6	6.3	No change	No change	High	Abundant	Very Good	Very Good			1	5
longleaf pine	Pinus palustris	NSH	Medium	33	547.5	14.5	Sm. inc.	Sm. inc.	Medium	Abundant	Very Good	Very Good			1	6
swamp tupelo	Nyssa biflora	NDH	Medium	49.4	471.2	7.3	Sm. inc.	Sm. inc.	Low	Common	Fair	Fair			1	7
laurel oak	Quercus laurifolia	NDH	Medium	46	360.8	5.8	Sm. inc.	Lg. inc.	Medium	Common	Good	Very Good			1	8
yellow-poplar	Liriodendron tulipifera	WDH	High	34.3	255.6	5.6	Sm. dec.	Sm. dec.	High	Common	Fair	Fair			1	9
black cherry	Prunus serotina	WDL	Medium	53.5	162.8	2.5	Lg. inc.	Lg. inc.	Low	Common	Good	Good			1	10
southern red oak	Quercus falcata	WDL	Medium	32.4	141.4	3.5	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	11
turkey oak	Quercus laevis	NSH	Medium	14.8	104.2	6.6	No change	No change	High	Common	Good	Good			1	12
sweetbay	Magnolia virginiana	NSL	Medium	26.1	103.8	2.9	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	13
pond cypress	Taxodium ascendens	NSH	Medium	7.5	89.3	6.6	No change	No change	Medium	Common	Fair	Fair	Infill +	Infill +	1	14
white oak	Quercus alba	WDH	Medium	19.4	82.8	2.7	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good			1	15
post oak	Quercus stellata	WDH	High	27.2	81.6	2.2	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	16
blackgum	Nyssa sylvatica	WDL	Medium	33	80.7	2.0	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	17
mockernut hickory	Carya alba	WDL	Medium	22.7	78.1	2.9	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	18
American holly	Ilex opaca	NSL	Medium	23.9	65.2	2.3	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	19
green ash	Fraxinus pennsylvanica	WSH	Low	17.7	61.6	2.7	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	20
willow oak	Quercus phellos	NSL	Low	14.3	61.6	3.2	No change	Sm. inc.	Medium	Common	Fair	Good			1	21
shortleaf pine	Pinus echinata	WDH	High	14.7	59.6	2.9	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	22
black willow	Salix nigra	NSH	Low	12.1	56.6	4.2	Lg. inc.	Lg. inc.	Low	Common	Good	Good			1	23
live oak	Quercus virginiana	NDH	High	7.3	56.3	4.6	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good	Infill ++	Infill ++	2	24
pond pine	Pinus serotina	NSH	Medium	7.7	55.2	4.5	Sm. dec.	No change	Low	Common	Poor	Poor	Infill +	Infill +	0	25
bald cypress	Taxodium distichum	NSH	Medium	8.4	53.0	4.9	No change	No change	Medium	Common	Fair	Fair	Infill +	Infill +	1	26
pignut hickory	Carya glabra	WDL	Medium	15.3	49.5	2.2	No change	No change	Medium	Rare	Poor	Poor			1	27
water tupelo	Nyssa aquatica	NSH	Medium	6.5	48.3	5.2	No change	No change	Low	Rare	Very Poor	Very Poor			0	28
winged elm	Ulmus alata	WDL	Medium	15.3	44.7	2.1	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			1	29
blackjack oak	Quercus marilandica	NSL	Medium	11.6	41.3	3.5	Lg. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	Infill ++	1	30
American elm	Ulmus americana	WDH	Medium	13.1	39.4	2.2	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	1	31
common persimmon	Diospyros virginiana	NSL	Low	22.4	39.0	1.5	Lg. dec.	Sm. dec.	High	Rare	Poor	Poor			1	32
flowering dogwood	Cornus florida	WDL	Medium	18.9	37.7	1.5	Sm. inc.	Sm. inc.	Medium	Rare	Fair	Fair			1	33
American hornbeam; musclev	Carpinus caroliniana	WSL	Low	12.3	35.6	2.1	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			1	34
redbay	Persea borbonia	NSL	Low	13.9	33.0	1.6	No change	No change	High	Rare	Fair	Fair			1	35
sugarberry	Celtis laevigata	NDH	Medium	6.8	32.9	3.6	Sm. inc.	Sm. inc.	Medium	Rare	Fair	Fair	Infill +	Infill +	1	36
eastern redcedar	Juniperus virginiana	WDH	Medium	7.6	28.1	2.7	Sm. inc.	Sm. inc.	Medium	Rare	Fair	Fair	Infill +	Infill +	1	37
sycamore	Platanus occidentalis	NSL	Low	5.2	22.3	2.9	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			2	38
pecan	Carya illinoensis	NSH	Low	3.6	22.0	4.5	Sm. dec.	No change	Low	Rare	Very Poor	Very Poor			2	39
sand pine	Pinus clausa	NDH	High	0.8	21.1	21.4	No change	No change	Low	Rare	Very Poor	Very Poor			2	40
bluejack oak	Quercus incana	NSL	Low	7.4	19.2	2.4	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	1	41
overcup oak	Quercus lyrata	NSL	Medium	4.5	17.6	3.4	No change	No change	Low	Rare	Very Poor	Very Poor			2	42
river birch	Betula nigra	NSL	Low	4.7	16.4	2.9	Sm. inc.	Lg. inc.	Medium	Rare	Fair	Good	Infill +	Infill ++	1	43
black oak	Quercus velutina	WDH	High	7.3	15.8	1.2	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	44
cherrybark oak; swamp red o.	Quercus pagoda	NSL	Medium	5.1	15.5	2.5	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	45
swamp chestnut oak	Quercus michauxii	NSL	Low	6	15.4	1.9	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	1	46
scarlet oak	Quercus coccinea	WDL	Medium	4.6	14.9	2.4	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			2	47



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loblolly-bay	Gordonia lasianthus	NSH	Medium	1.8	12.8	3.0	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	48
southern magnolia	Magnolia grandiflora	NSL	Low	5	12.7	1.6	Sm. inc.	Lg. inc.	Medium	Rare	Fair	Good	Infill +	Infill ++	1	49
sand hickory	Carya pallida	NSL	FIA	3.6	12.4	3.8	Unknown	Unknown	NA	Rare	FIA Only	FIA Only			0	50
sourwood	Oxydendrum arboreum	NDL	High	6.1	12.0	1.1	Sm. dec.	No change	High	Rare	Poor	Fair	Infill +	Infill +	2	51
sassafras	Sassafras albidum	WSL	Low	9.1	11.7	1.1	Sm. inc.	Sm. inc.	Medium	Rare	Fair	Fair	Infill +	Infill +	1	52
spruce pine	Pinus glabra	NSL	Low	2.5	11.4	3.0	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			2	53
northern red oak	Quercus rubra	WDH	Medium	2.3	11.2	2.2	Sm. dec.	Lg. dec.	High	Rare	Poor	Poor	Infill +	Infill +	2	54
florida maple	Acer barbatum	NSL	Low	4.5	10.8	1.6	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor	Infill +	Infill +	2	55
water hickory	Carya aquatica	NSL	Medium	3.2	10.3	3.0	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			2	56
ogeechee tupelo	Nyssa ogeche	NSLX	FIA	2.4	9.9	2.7	Unknown	Unknown	Low	Rare	FIA Only	FIA Only			0	57
boxelder	Acer negundo	WSH	Low	2.4	9.4	3.6	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor		Infill +	2	58
eastern hophornbeam; ironw	Ostrya virginiana	WSL	Low	4.1	8.9	1.4	Sm. inc.	Sm. inc.	High	Rare	Good	Good	Infill ++	Infill ++	1	59
American beech	Fagus grandifolia	WDH	High	3	8.3	1.7	Sm. inc.	Sm. inc.	Medium	Rare	Fair	Fair	Infill +	Infill +	2	60
slippery elm	Ulmus rubra	WSL	Low	4.5	7.6	1.5	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	61
red mulberry	Morus rubra	NSL	Low	5.6	7.0	0.9	Sm. dec.	No change	Medium	Rare	Very Poor	Poor		Infill +	1	62
hackberry	Celtis occidentalis	WDH	Medium	1.5	5.6	2.2	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor	Infill +		2	63
chestnut oak	Quercus prinus	NDH	High	0.7	5.1	2.6	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor	Infill +	Infill +	2	64
bitternut hickory	Carya cordiformis	WSL	Low	0.8	3.7	2.8	Lg. dec.	Lg. dec.	High	Rare	Poor	Poor			0	65
Virginia pine	Pinus virginiana	NDH	High	0.6	3.0	2.2	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	66
wild plum	Prunus americana	NSLX	FIA	2.8	3.0	0.8	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	67
silver maple	Acer saccharinum	NSH	Low	0.4	3.0	8.1	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor		Infill +	2	68
shagbark hickory	Carya ovata	WSL	Medium	0.8	2.5	1.4	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			2	69
eastern redbud	Cercis canadensis	NSL	Low	2.8	2.4	0.5	Sm. dec.	No change	Medium	Rare	Very Poor	Poor		Infill +	1	70
Atlantic white-cedar	Chamaecyparis thyoides	NSH	Low	0.6	2.4	2.3	Sm. dec.	Sm. dec.	Low	Rare	Very Poor	Very Poor			0	71
ailanthus	Ailanthus altissima	NSL	FIA	0.4	2.1	4.2	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	72
eastern cottonwood	Populus deltoides	NSH	Low	1.1	2.0	1.5	Sm. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	73
water elm	Planera aquatica	NSL	Low	1.1	1.9	1.7	Sm. dec.	No change	Medium	Rare	Very Poor	Poor		Infill +	2	74
black walnut	Juglans nigra	WDH	Low	0.9	1.5	1.5	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	75
white ash	Fraxinus americana	WDH	Medium	0.9	1.4	1.0	No change	No change	Low	Rare	Very Poor	Very Poor			2	76
black locust	Robinia pseudoacacia	NDL	Low	0.5	1.3	1.1	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	77
pawpaw	Asimina triloba	NSL	Low	1.3	1.3	1.4	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	78
Shumard oak	Quercus shumardii	NSL	Low	0.5	1.0	2.1	No change	No change	High	Rare	Fair	Fair			0	79
American basswood	Tilia americana	WSL	Medium	0.1	0.8	0.5	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	80
white mulberry	Morus alba	NSL	FIA	0.4	0.5	0.5	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	81
northern white-cedar	Thuja occidentalis	WSH	High	0.1	0.3	1.9	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	82
sugar maple	Acer saccharum	WDH	High	0.1	0.2	2.0	Very Lg. dec.	Very Lg. dec.	High	Rare	Lost	Lost			0	83
waterlocust	Gleditsia aquatica	NSLX	FIA	0.5	0.2	0.5	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	84
silverbell	Halesia spp.	NSL	Low	0.1	0.2	1.8	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	85
shellbark hickory	Carya laciniosa	NSL	Low	0	0.2	0.4	No change	No change	Medium	Rare	Poor	Poor			0	86
bigleaf magnolia	Magnolia macrophylla	NSL	Low	0.1	0.2	1.6	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	87
pumpkin ash	Fraxinus profunda	NSH	FIA	0	0.2	0.2	Unknown	Unknown	NA	Rare	FIA Only	FIA Only			0	88
serviceberry	Amelanchier spp.	NSL	Low	0.2	0.2	0.6	No change	No change	Medium	Rare	Poor	Poor			0	89
pitch pine	Pinus rigida	NSH	High	0.1	0.2	1.3	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	90
paulownia	Paulownia tomentosa	NSL	FIA	0.1	0.1	0.6	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	91
bear oak; scrub oak	Quercus ilicifolia	NSLX	FIA	0	0.1	0.1	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	92
American chestnut	Castanea dentata	NSLX	FIA	0.1	0.1	0.5	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	93
yellow buckeye	Aesculus flava	NSL	Low	0.1	0.1	0.4	Sm. dec.	Sm. dec.	Low	Rare	Very Poor	Very Poor			0	94



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Common Name	Scientific Name	Range	MR	%Cell	FIAsum	FIAiv	ChngCl45	ChngCl85	Adap	Abund	Capabil45	Capabil85	SHIFT45	SHIFT85	SSO	N
butternut	Juglans cinerea	NSLX	FIA	0.1	0.1	0.3	Unknown	Unknown	Low	Rare	FIA Only	FIA Only			0	95
ashe juniper	Juniperus ashei	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			0	96
Table Mountain pine	Pinus pungens	NSL	Low	0	0	0	Unknown	Unknown	High	Absent	Unknown	Unknown			0	97
cittamwood/gum bumelia	Sideroxylon lanuginosum ssp.	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			3	98
black hickory	Carya texana	NDL	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	99
black ash	Fraxinus nigra	WSH	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat			3	100
honeylocust	Gleditsia triacanthos	NSH	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Likely +	Likely +	3	101
Osage-orange	Maclura pomifera	NDH	Medium	0	0	0	Unknown	Unknown	High	Modeled	Unknown	Unknown			0	102
cucumbertree	Magnolia acuminata	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	103
pin cherry	Prunus pensylvanica	NSL	Low	0	0	0	New Habitat	Unknown	Medium	Absent	New Habitat	Unknown			3	104
swamp white oak	Quercus bicolor	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	105
chinkapin oak	Quercus muehlenbergii	NSL	Medium	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	106
cabbage palmetto	Sabal palmetto	NDH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			0	107
cedar elm	Ulmus crassifolia	NDH	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat			3	108