

	sq. km	sq. mi	FIA Plots
Area of Region	84,963	32,804	2,470

**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									
Hickory	7									
Maple	6	Abundant 6	High 22	30	Increase 31	38	Very Good 12	17	Likely 1	1
Oak	20	Common 27	Medium 40	60	No Change 17	14	Good 19	18	Infill 16	19
Pine	8	Rare 66	Low 42	18	Decrease 41	37	Fair 12	16	Migrate 2	3
Other	54	Absent 14	FIA 10		New 10	10	Poor 18	12		
	<b>99</b>	<b>113</b>	<b>114</b>	<b>108</b>	Unknown 15	15	Very Poor 27	24	<b>19</b>	<b>23</b>
					<b>114</b>	<b>114</b>	FIA Only 7	7		
							Unknown 5	5		
							<b>100</b>	<b>99</b>		

**Potential Changes in Climate Variables**

**Temperature (°F)**

	Scenario	2009	2039	2069	2099	
Annual Average	CCSM45	58.1	59.9	62.0	62.2	
	CCSM85	58.1	60.3	62.7	65.7	
	GFDL45	58.1	60.9	63.3	64.2	
	GFDL85	58.1	61.1	64.4	68.2	
	HAD45	58.1	60.4	63.5	64.8	
	HAD85	58.1	60.7	64.6	68.9	
Growing Season May—Sep	CCSM45	72.6	74.4	76.3	76.8	
	CCSM85	72.6	74.7	77.3	81.0	
	GFDL45	72.6	75.7	78.4	79.8	
	GFDL85	72.6	76.2	79.9	84.1	
	HAD45	72.6	75.5	78.4	80.0	
	HAD85	72.6	75.5	80.7	85.3	
Coldest Month Average	CCSM45	36.7	38.9	39.8	40.0	
	CCSM85	36.7	39.2	40.2	41.4	
	GFDL45	36.7	40.0	40.4	41.0	
	GFDL85	36.7	38.9	39.9	41.0	
	HAD45	36.7	37.5	39.3	39.6	
	HAD85	36.7	37.9	39.3	40.8	
Warmest Month Average	CCSM45	78.0	80.1	81.2	81.2	
	CCSM85	78.0	80.3	82.0	83.7	
	GFDL45	78.0	81.1	82.3	83.4	
	GFDL85	78.0	81.9	83.9	86.4	
	HAD45	78.0	81.3	83.3	84.0	
	HAD85	78.0	82.0	85.2	88.0	

**Precipitation (in)**

	Scenario	2009	2039	2069	2099	
Annual Total	CCSM45	45.0	49.3	52.0	52.8	
	CCSM85	45.0	50.2	52.6	58.5	
	GFDL45	45.0	50.2	53.8	56.2	
	GFDL85	45.0	48.7	54.7	55.5	
	HAD45	45.0	48.0	49.3	48.7	
	HAD85	45.0	50.6	47.2	49.1	
Growing Season May—Sep	CCSM45	20.2	23.9	25.5	26.2	
	CCSM85	20.2	23.5	24.5	27.5	
	GFDL45	20.2	23.3	25.4	26.5	
	GFDL85	20.2	22.0	26.2	26.6	
	HAD45	20.2	21.8	21.4	21.3	
	HAD85	20.2	23.5	21.0	20.9	

**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-DGP30 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	58.3	1815.4	25.9	Sm. inc.	Sm. inc.	Medium	Abundant	Very Good	Very Good			1	1
yellow-poplar	Liriodendron tulipifera	WDH	High	86.1	1142.5	11.4	Lg. dec.	Lg. dec.	High	Abundant	Good	Good			1	2
red maple	Acer rubrum	WDH	High	89.3	856.2	8.2	Sm. dec.	Sm. dec.	High	Abundant	Good	Good			1	3
sweetgum	Liquidambar styraciflua	WDH	High	70.1	817.9	10.6	Sm. inc.	Sm. inc.	Medium	Abundant	Very Good	Very Good			1	4
Virginia pine	Pinus virginiana	NDH	High	63.9	799.3	11.3	Lg. dec.	Lg. dec.	Medium	Abundant	Fair	Fair			0	5
white oak	Quercus alba	WDH	Medium	82.3	746.9	7.9	No change	No change	High	Abundant	Very Good	Very Good			1	6
shortleaf pine	Pinus echinata	WDH	High	48.8	303.9	6.0	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	7
chestnut oak	Quercus prinus	NDH	High	24.2	245.6	7.7	Sm. dec.	Sm. dec.	High	Common	Fair	Fair			1	8
sourwood	Oxydendrum arboreum	NDL	High	57	241.3	3.7	Sm. dec.	Lg. dec.	High	Common	Fair	Fair			1	9
eastern redcedar	Juniperus virginiana	WDH	Medium	59.7	240.6	3.6	Sm. inc.	Lg. inc.	Medium	Common	Good	Very Good			1	10
southern red oak	Quercus falcata	WDL	Medium	56.9	207.9	3.3	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	11
black cherry	Prunus serotina	WDL	Medium	61.7	194.4	2.9	Sm. inc.	Sm. inc.	Low	Common	Fair	Fair			1	12
mockernut hickory	Carya alba	WDL	Medium	58.3	177.5	2.6	Sm. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	13
pignut hickory	Carya glabra	WDL	Medium	58.2	173.2	2.5	No change	Sm. dec.	Medium	Common	Fair	Poor			1	14
scarlet oak	Quercus coccinea	WDL	Medium	42.4	171.1	3.5	Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor			0	15
northern red oak	Quercus rubra	WDH	Medium	51.1	167.4	2.9	No change	No change	High	Common	Good	Good			1	16
blackgum	Nyssa sylvatica	WDL	Medium	67.1	166.4	2.1	Sm. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	17
American beech	Fagus grandifolia	WDH	High	39.5	141.7	3.2	No change	Sm. inc.	Medium	Common	Fair	Good			1	18
flowering dogwood	Cornus florida	WDL	Medium	63.5	110.1	1.6	No change	Sm. inc.	Medium	Common	Fair	Good			1	19
black oak	Quercus velutina	WDH	High	42.7	107.7	2.2	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	20
American hornbeam; muscle	Carpinus caroliniana	WSL	Low	39.7	104.5	2.4	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	21
white ash	Fraxinus americana	WDL	Medium	30	95.0	2.9	No change	Sm. inc.	Low	Common	Poor	Fair			1	22
eastern white pine	Pinus strobus	WDH	High	9.4	94.1	6.7	Sm. dec.	Sm. dec.	Low	Common	Poor	Poor	Infill +	Infill +	0	23
winged elm	Ulmus alata	WDL	Medium	31.8	86.3	2.6	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	24
post oak	Quercus stellata	WDH	High	31.3	85.5	2.4	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	25
willow oak	Quercus phellos	NSL	Low	26.5	83.8	2.8	Sm. inc.	Lg. inc.	Medium	Common	Good	Very Good			1	26
green ash	Fraxinus pennsylvanica	WSH	Low	23.1	78.7	2.7	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	27
water oak	Quercus nigra	WDH	High	11.6	65.1	4.1	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good	Infill ++	Infill ++	1	28
sycamore	Platanus occidentalis	NSL	Low	18	64.4	3.3	Sm. inc.	Lg. inc.	Medium	Common	Good	Very Good			1	29
American elm	Ulmus americana	WDH	Medium	28.7	61.8	2.1	Sm. inc.	Lg. inc.	Medium	Common	Good	Very Good			1	30
American holly	Ilex opaca	NSL	Medium	28.2	61.2	1.8	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	31
river birch	Betula nigra	NSL	Low	13.3	60.9	4.3	Sm. inc.	Lg. inc.	Medium	Common	Good	Very Good			1	32
black locust	Robinia pseudoacacia	NDH	Low	14.6	53.1	2.8	Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor			0	33
ailanthus	Ailanthus altissima	NSL	FIA	9.9	49.9	4.3	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	34
black walnut	Juglans nigra	WDH	Low	13.6	47.3	3.1	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	35
common persimmon	Diospyros virginiana	NSL	Low	17.1	41.4	2.1	Lg. dec.	Sm. dec.	High	Rare	Poor	Poor			1	36
eastern redbud	Cercis canadensis	NSL	Low	19.4	34.0	1.5	Lg. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	37
shagbark hickory	Carya ovata	WSL	Medium	11	31.3	2.6	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	38
slippery elm	Ulmus rubra	WSL	Low	12.4	31.1	2.1	Lg. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	39
boxelder	Acer negundo	WSH	Low	6.6	29.3	3.8	Sm. dec.	No change	High	Rare	Poor	Fair	Infill +	Infill +	1	40
hackberry	Celtis occidentalis	WDH	Medium	7.6	28.3	3.7	Sm. dec.	No change	High	Rare	Poor	Fair	Infill +	Infill +	1	41
pitch pine	Pinus rigida	NSH	High	3.9	18.4	2.4	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	42
sweet birch	Betula lenta	NDH	High	4	17.2	1.8	Sm. dec.	Sm. dec.	Low	Rare	Very Poor	Very Poor			2	43
black willow	Salix nigra	NSH	Low	3.6	15.7	3.5	No change	Sm. inc.	Low	Rare	Very Poor	Poor		Infill +	2	44
florida maple	Acer barbatum	NSL	Low	7	15.3	2.1	No change	No change	High	Rare	Fair	Fair	Infill +	Infill +	1	45
sassafras	Sassafras albidum	WSL	Low	10.8	14.4	1.0	Sm. inc.	Lg. inc.	Medium	Rare	Fair	Good			1	46
eastern hemlock	Tsuga canadensis	NSH	High	2.1	14.0	1.8	No change	No change	Low	Rare	Very Poor	Very Poor			2	47



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Common Name	Scientific Name	Range	MR	%Cell	FIAsum	FIAiv	ChngCl45	ChngCl85	Adap	Abund	Capabil45	Capabil85	SHIFT45	SHIFT85	SSO	N
bitternut hickory	Carya cordiformis	WSL	Low	6.4	13.8	1.9	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor	Infill +	Infill +	2	48
longleaf pine	Pinus palustris	NSH	Medium	1	9.8	7.1	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	49
pecan	Carya illinoensis	NSH	Low	1.6	9.8	7.5	No change	Lg. inc.	Low	Rare	Very Poor	Fair		Infill +	2	50
swamp tupelo	Nyssa biflora	NDH	Medium	1.7	9.8	3.3	No change	No change	Low	Rare	Very Poor	Very Poor			2	51
eastern hophornbeam; ironw	Ostrya virginiana	WSL	Low	5.4	8.3	1.5	Lg. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	Infill ++	1	52
red mulberry	Morus rubra	NSL	Low	4.4	7.5	1.4	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	1	53
mountain or Fraser magnolia	Magnolia fraseri	NSL	Low	1.8	7.0	1.8	Sm. dec.	Sm. dec.	Low	Rare	Very Poor	Very Poor			0	54
sugarberry	Celtis laevigata	NDH	Medium	1.3	6.6	4.1	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	55
sugar maple	Acer saccharum	WDH	High	3	5.7	1.6	No change	No change	High	Rare	Fair	Fair	Infill +	Infill +	2	56
blackjack oak	Quercus marilandica	NSL	Medium	2.1	5.6	1.7	Lg. inc.	Lg. inc.	High	Rare	Good	Good			2	57
cucumbertree	Magnolia acuminata	NSL	Low	3	5.4	1.2	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			2	58
bigtooth aspen	Populus grandidentata	NSL	Medium	1.8	5.3	2.1	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	59
paulownia	Paulownia tomentosa	NSL	FIA	1.3	4.6	2.2	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	60
butternut	Juglans cinerea	NSLX	FIA	0.9	4.6	4.8	Unknown	Unknown	Low	Rare	FIA Only	FIA Only			0	61
pin oak	Quercus palustris	NSH	Low	0.9	4.4	2.5	Sm. dec.	Sm. dec.	Low	Rare	Very Poor	Very Poor			2	62
sweetbay	Magnolia virginiana	NSL	Medium	1	3.2	1.1	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	63
honeylocust	Gleditsia triacanthos	NSH	Low	1.8	3.1	1.6	No change	Sm. inc.	High	Rare	Fair	Good	Infill +		2	64
cherrybark oak; swamp red o.	Quercus pagoda	NSL	Medium	1.6	3.0	1.6	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	65
bald cypress	Taxodium distichum	NSH	Medium	0.1	2.9	23.9	No change	Sm. inc.	Medium	Rare	Poor	Fair	Infill +	Infill +	2	66
laurel oak	Quercus laurifolia	NDH	Medium	2.2	2.9	1.2	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	2	67
swamp chestnut oak	Quercus michauxii	NSL	Low	1.2	2.7	1.6	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	68
pawpaw	Asimina triloba	NSL	Low	2.8	2.7	0.7	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	69
American basswood	Tilia americana	WSL	Medium	0.8	2.6	1.9	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			2	70
eastern cottonwood	Populus deltoides	NSH	Low	0.3	2.5	2.7	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	71
sand hickory	Carya pallida	NSL	FIA	1	1.9	1.4	Unknown	Unknown	NA	Rare	FIA Only	FIA Only			0	72
serviceberry	Amelanchier spp.	NSL	Low	2.7	1.6	0.6	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	73
white mulberry	Morus alba	NSL	FIA	0.9	1.5	1.5	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	74
pin cherry	Prunus pensylvanica	NSL	Low	0.4	1.4	3.0	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	75
Table Mountain pine	Pinus pungens	NSL	Low	0.3	1.1	1.1	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor		Infill +	2	76
overcup oak	Quercus laevis	NSL	Medium	0.1	0.9	7.2	Lg. inc.	Lg. inc.	Low	Rare	Fair	Fair	Infill +	Infill +	2	77
silverbell	Halesia spp.	NSL	Low	0.7	0.8	0.8	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			2	78
Osage-orange	Maclura pomifera	NDH	Medium	0.3	0.6	1.4	Sm. dec.	No change	High	Rare	Poor	Fair		Infill +	2	79
striped maple	Acer pensylvanicum	NSL	Medium	1	0.6	0.4	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	80
yellow birch	Betula alleghaniensis	NDL	High	0.5	0.6	1.3	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			2	81
shingle oak	Quercus imbricaria	NDH	Medium	0.5	0.6	1.3	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	82
southern magnolia	Magnolia grandiflora	NSL	Low	0.4	0.5	1.0	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	83
turkey oak	Quercus laevis	NSH	Medium	0.2	0.5	0.5	Lg. dec.	Lg. dec.	High	Rare	Poor	Poor			0	84
shellbark hickory	Carya laciniosa	NSL	Low	0.2	0.3	1.3	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	85
chinkapin oak	Quercus muehlenbergii	NSL	Medium	0.1	0.3	2.7	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	86
American chestnut	Castanea dentata	NSLX	FIA	0.2	0.3	0.3	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	87
bigleaf magnolia	Magnolia macrophylla	NSL	Low	0.3	0.3	0.7	Lg. dec.	Very Lg. dec.	Medium	Rare	Very Poor	Lost			0	88
pond pine	Pinus serotina	NSH	Medium	0.2	0.3	1.0	Very Lg. dec.	Very Lg. dec.	Low	Rare	Lost	Lost			0	89
Carolina ash	Fraxinus caroliniana	NSL	FIA	0.1	0.2	1.8	Unknown	Unknown	NA	Rare	FIA Only	FIA Only			0	90
yellow buckeye	Aesculus flava	NSL	Low	0.1	0.2	0.3	Lg. dec.	Sm. dec.	Low	Rare	Very Poor	Very Poor			0	91
water tupelo	Nyssa aquatica	NSH	Medium	0.1	0.1	0.3	Sm. inc.	Lg. inc.	Low	Rare	Poor	Fair	Infill +	Infill +	2	92
pumpkin ash	Fraxinus profunda	NSH	FIA	0.1	0.1	0.5	Unknown	Unknown	NA	Rare	FIA Only	FIA Only			0	93
silver maple	Acer saccharinum	NSH	Low	0.1	0.1	0.6	Lg. dec.	No change	High	Rare	Poor	Fair			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
redbay	Persea borbonia	NSL	Low	0.1	0.1	0.6	Lg. dec.	No change	High	Rare	Poor	Fair			0	95
wild plum	Prunus americana	NSLX	FIA	0.1	0.0	0.3	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	96
bear oak; scrub oak	Quercus ilicifolia	NSLX	FIA	0.1	0.0	0.2	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	97
bluejack oak	Quercus incana	NSL	Low	0.1	0.0	0.3	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	98
loblolly-bay	Gordonia lasianthus	NSH	Medium	0	0.0	0.0	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	99
ashe juniper	Juniperus ashei	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			0	100
slash pine	Pinus elliotii	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate ++	Migrate ++	3	101
black maple	Acer nigrum	NSH	Low	0	0	0	Unknown	Unknown	High	Absent	Unknown	Unknown			0	102
mountain maple	Acer spicatum	NSL	Low	0	0	0	Unknown	Unknown	High	Absent	Unknown	Unknown			0	103
Ohio buckeye	Aesculus glabra	NSL	Low	0	0	0	Unknown	Unknown	Medium	Modeled	Unknown	Unknown			0	104
cittamwood/gum bumelia	Sideroxylon lanuginosum ssp.	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			3	105
water hickory	Carya aquatica	NSL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +	3	106
black hickory	Carya texana	NDL	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	107
black ash	Fraxinus nigra	WSH	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat			3	108
blue ash	Fraxinus quadrangulata	NSL	Low	0	0	0	Unknown	Unknown	Low	Absent	Unknown	Unknown			0	109
bur oak	Quercus macrocarpa	NDH	Medium	0	0	0	Unknown	Unknown	High	Absent	Unknown	Unknown			0	110
Nuttall oak	Quercus texana	NSH	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			0	111
Shumard oak	Quercus shumardii	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Likely +	Likely +	3	112
live oak	Quercus virginiana	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate ++	Migrate ++	3	113
cedar elm	Ulmus crassifolia	NDH	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat			0	114