

	sq. km	sq. mi	FIA Plots
Area of Region	19,240	7,428.6	308

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	3			High	23	25	Increase	20	20	Very Good	6	5	Likely	2	2
Hickory	3			Medium	36	57	No Change	12	13	Good	14	14	Infill	23	27
Maple	5	Abundant	5	Low	36	15	Decrease	31	30	Fair	9	15	Migrate	10	13
Oak	15	Common	18	FIA	8		New	24	27	Poor	18	14		35	42
Pine	7	Rare	48				Unknown	16	13	Very Poor	12	13			
Other	38	Absent	30							FIA Only	2	2			
	71		101		103	97		103	103	Unknown	8	5			
											69	68			

Potential Changes in Climate Variables

Temperature (°F)

	Scenario	2009	2039	2069	2099	
Annual Average	CCSM45	55.1	56.8	58.8	59.0	
	CCSM85	55.1	57.1	59.5	62.4	
	GFDL45	55.1	59.0	60.4	61.5	
	GFDL85	55.1	58.2	61.6	65.4	
	HAD45	55.1	57.4	60.6	62.0	
HAD85	55.1	57.5	61.3	65.6		
Growing Season (May—Sep)	CCSM45	70.8	72.5	74.2	74.5	
	CCSM85	70.8	72.7	75.1	78.5	
	GFDL45	70.8	75.2	76.8	78.1	
	GFDL85	70.8	74.4	78.2	82.4	
	HAD45	70.8	73.4	76.2	77.9	
HAD85	70.8	73.0	77.3	81.8		
Coldest Month (Average)	CCSM45	31.7	33.8	35.1	35.6	
	CCSM85	31.7	34.3	35.5	37.1	
	GFDL45	31.7	34.9	35.6	36.3	
	GFDL85	31.7	34.7	35.9	37.5	
	HAD45	31.7	33.0	35.1	35.4	
HAD85	31.7	33.8	35.4	37.5		
Warmest Month (Average)	CCSM45	76.8	78.7	79.6	79.7	
	CCSM85	76.8	78.8	80.5	81.9	
	GFDL45	76.8	79.7	81.3	82.4	
	GFDL85	76.8	80.8	82.9	85.4	
	HAD45	76.8	79.8	81.3	82.1	
HAD85	76.8	79.6	82.0	84.9		

Precipitation (in)

	Scenario	2009	2039	2069	2099	
Annual Total	CCSM45	45.1	48.3	50.7	52.7	
	CCSM85	45.1	49.5	50.9	56.5	
	GFDL45	45.1	50.7	54.3	54.6	
	GFDL85	45.1	48.5	54.3	55.9	
	HAD45	45.1	48.0	49.5	48.6	
HAD85	45.1	52.1	47.8	50.3		
Growing Season (May—Sep)	CCSM45	20.0	24.0	24.8	26.2	
	CCSM85	20.0	23.5	24.1	26.4	
	GFDL45	20.0	21.8	23.6	24.7	
	GFDL85	20.0	21.0	23.6	24.4	
	HAD45	20.0	21.9	20.7	19.1	
HAD85	20.0	22.6	19.2	19.1		

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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Section 232A

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
pitch pine	Pinus rigida	NSH	High	35.3	1127.5	37.0	Lg. dec.	Lg. dec.	Medium	Abundant	Fair	Fair			0	1
red maple	Acer rubrum	WDH	High	66.4	862.0	12.4	No change	No change	High	Abundant	Very Good	Very Good			1	2
sweetgum	Liquidambar styraciflua	WDH	High	42.5	659.0	14.3	Sm. inc.	Sm. inc.	Medium	Abundant	Very Good	Very Good			1	3
white oak	Quercus alba	WDH	Medium	50.9	655.0	12.9	Sm. dec.	Sm. dec.	High	Abundant	Good	Good			1	4
yellow-poplar	Liriodendron tulipifera	WDH	High	36	530.7	11.9	Sm. dec.	Lg. dec.	High	Abundant	Good	Good			1	5
blackgum	Nyssa sylvatica	WDL	Medium	57.2	298.6	4.9	No change	No change	High	Common	Good	Good			1	6
scarlet oak	Quercus coccinea	WDL	Medium	42.4	236.4	7.0	Sm. dec.	Lg. dec.	Medium	Common	Poor	Poor			0	7
American beech	Fagus grandifolia	WDH	High	27.6	233.0	7.8	Sm. dec.	Sm. dec.	Medium	Common	Poor	Poor	Infill +	Infill +	0	8
black oak	Quercus velutina	WDH	High	35.6	225.8	6.9	Sm. inc.	No change	Medium	Common	Good	Fair			1	9
black cherry	Prunus serotina	WDL	Medium	33	221.1	7.0	No change	Sm. inc.	Low	Common	Poor	Fair			1	10
Virginia pine	Pinus virginiana	NDH	High	19.6	214.0	7.7	Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor			0	11
Atlantic white-cedar	Chamaecyparis thyoides	NSH	Low	9.5	186.8	21.1	Sm. dec.	Sm. dec.	Low	Common	Poor	Poor	Infill +	Infill +	0	12
American holly	Ilex opaca	NSL	Medium	25.3	163.9	4.6	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	13
chestnut oak	Quercus prinus	NDH	High	23.1	149.0	8.2	Lg. dec.	Lg. dec.	High	Common	Fair	Fair			1	14
loblolly pine	Pinus taeda	WDH	High	7.2	107.1	6.2	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good	Infill ++	Infill ++	2	15
black locust	Robinia pseudoacacia	NDH	Low	16.8	105.3	6.7	Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor			0	16
southern red oak	Quercus falcata	WDL	Medium	21.1	105.2	4.8	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	17
sassafras	Sassafras albidum	WSL	Low	41	103.0	3.4	Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor			0	18
northern red oak	Quercus rubra	WDH	Medium	24.5	65.3	3.5	Sm. inc.	Sm. dec.	High	Common	Very Good	Fair			1	19
white ash	Fraxinus americana	WDL	Medium	12.4	60.9	5.0	Sm. dec.	Sm. dec.	Low	Common	Poor	Poor			0	20
mockernut hickory	Carya alba	WDL	Medium	14.2	58.5	3.6	Sm. inc.	Lg. inc.	High	Common	Very Good	Very Good	Infill ++	Infill ++	1	21
eastern redcedar	Juniperus virginiana	WDH	Medium	12.7	57.3	5.4	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	22
shortleaf pine	Pinus echinata	WDH	High	6.5	50.4	9.8	No change	No change	Medium	Common	Fair	Fair	Infill +	Infill +	1	23
willow oak	Quercus phellos	NSL	Low	8.9	48.2	2.9	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	1	24
pignut hickory	Carya glabra	WDL	Medium	8.8	47.7	2.8	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	1	25
black walnut	Juglans nigra	WDH	Low	7.3	45.6	6.5	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	26
pin oak	Quercus palustris	NSH	Low	7.3	41.0	5.5	Sm. dec.	Sm. dec.	Low	Rare	Very Poor	Very Poor			0	27
sycamore	Platanus occidentalis	NSL	Low	10.6	30.0	4.9	Sm. inc.	Lg. inc.	Medium	Rare	Fair	Good	Infill +	Infill ++	1	28
American hornbeam; musclev	Carpinus caroliniana	WSL	Low	11	25.1	2.1	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	1	29
eastern white pine	Pinus strobus	WDH	High	6.4	22.4	3.8	Lg. dec.	Lg. dec.	Low	Rare	Very Poor	Very Poor			0	30
post oak	Quercus stellata	WDH	High	8.8	20.1	2.2	Sm. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	Infill ++	2	31
eastern cottonwood	Populus deltoides	NSH	Low	1.8	19.5	13.0	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			2	32
sweetbay	Magnolia virginiana	NSL	Medium	10.9	18.1	1.2	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	1	33
boxelder	Acer negundo	WSH	Low	10.4	17.7	1.9	Lg. dec.	Lg. dec.	High	Rare	Poor	Poor	Infill +	Infill +	1	34
common persimmon	Diospyros virginiana	NSL	Low	6.9	15.7	1.8	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor	Infill +	Infill +	1	35
bitternut hickory	Carya cordiformis	WSL	Low	1.7	15.3	4.5	No change	No change	High	Rare	Fair	Fair	Infill +	Infill +	2	36
slippery elm	Ulmus rubra	WSL	Low	4.2	12.6	3.0	Sm. dec.	No change	Medium	Rare	Very Poor	Poor		Infill +	1	37
blackjack oak	Quercus marilandica	NSL	Medium	5.7	12.4	2.2	Sm. dec.	No change	High	Rare	Poor	Fair		Infill +	2	38
sweet birch	Betula lenta	NDH	High	4.4	12.0	3.4	Lg. dec.	Lg. dec.	Low	Rare	Very Poor	Very Poor			2	39
ailanthus	Ailanthus altissima	NSL	FIA	6.4	11.5	2.5	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	40
swamp chestnut oak	Quercus michauxii	NSL	Low	5.1	10.4	2.2	No change	Sm. inc.	Medium	Rare	Poor	Fair	Infill +	Infill +	2	41
river birch	Betula nigra	NSL	Low	3.8	9.0	2.4	No change	Sm. inc.	Medium	Rare	Poor	Fair	Infill +	Infill +	2	42
green ash	Fraxinus pennsylvanica	WSH	Low	2.9	8.9	3.2	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	2	43
flowering dogwood	Cornus florida	WDL	Medium	6.3	8.9	1.1	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	1	44
Norway maple	Acer platanoides	NSL	FIA	6.5	8.3	1.7	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	45
paulownia	Paulownia tomentosa	NSL	FIA	1.8	7.5	13.5	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	46
bear oak; scrub oak	Quercus ilicifolia	NSLX	FIA	6.3	7.3	1.2	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	47



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Common Name	Scientific Name	Range	MR	%Cell	FIAsum	FIAiv	ChngCl45	ChngCl85	Adap	Abund	Capabil45	Capabil85	SHIFT45	SHIFT85	SSO	N
silver maple	Acer saccharinum	NSH	Low	3	6.8	6.4	No change	No change	High	Rare	Fair	Fair	Infill +	Infill +	2	48
American elm	Ulmus americana	WDH	Medium	6.8	6.5	2.2	Sm. inc.	Lg. inc.	Medium	Rare	Fair	Good	Infill +	Infill ++	2	49
pawpaw	Asimina triloba	NSL	Low	2.7	6.2	1.3	Sm. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	50
black willow	Salix nigra	NSH	Low	1.4	5.9	3.1	Sm. inc.	Lg. inc.	Low	Rare	Poor	Fair	Infill +	Infill +	2	51
cherrybark oak; swamp red o.	Quercus pagoda	NSL	Medium	1.2	5.5	1.5	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	52
white mulberry	Morus alba	NSL	FIA	2.2	4.4	2.6	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	53
red mulberry	Morus rubra	NSL	Low	1	3.4	12.3	Very Lg. dec.	Very Lg. dec.	Medium	Rare	Lost	Lost			0	54
bigtooth aspen	Populus grandidentata	NSL	Medium	1.6	2.9	1.8	Very Lg. dec.	Very Lg. dec.	Medium	Rare	Lost	Lost			0	55
pond pine	Pinus serotina	NSH	Medium	0.5	2.7	5.3	Lg. inc.	Lg. inc.	Low	Rare	Fair	Fair	Infill +	Infill +	2	56
gray birch	Betula populifolia	NSL	Low	5	2.6	1.3	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	57
hackberry	Celtis occidentalis	WDH	Medium	3.8	2.6	2.0	No change	Sm. dec.	High	Rare	Fair	Poor	Infill +	Infill +	2	58
sugar maple	Acer saccharum	WDH	High	2.3	1.5	2.6	Sm. inc.	No change	High	Rare	Good	Fair		Infill +	2	59
swamp white oak	Quercus bicolor	NSL	Low	2.4	1.4	1.5	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			2	60
Scots pine	Pinus sylvestris	NSH	FIA	0.5	1.1	2.2	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	61
Norway spruce	Picea abies	NSH	FIA	4	1.0	3.7	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	62
Osage-orange	Maclura pomifera	NDH	Medium	0.4	0.6	0.8	Sm. dec.	No change	High	Rare	Poor	Fair		Infill +	2	63
quaking aspen	Populus tremuloides	WDH	High	0.5	0.5	0.9	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	64
black ash	Fraxinus nigra	WSH	Medium	0.5	0.4	0.7	Very Lg. dec.	Lg. dec.	Low	Rare	Lost	Very Poor			0	65
serviceberry	Amelanchier spp.	NSL	Low	0.5	0.3	0.6	Very Lg. dec.	Lg. dec.	Medium	Rare	Lost	Very Poor			0	66
yellow birch	Betula alleghaniensis	NDL	High	0.5	0.3	0.6	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	67
American chestnut	Castanea dentata	NSLX	FIA	0.5	0.3	0.5	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	68
laurel oak	Quercus laurifolia	NDH	Medium	2	0.2	1.2	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	69
eastern hemlock	Tsuga canadensis	NSH	High	0.8	0.1	0.3	Lg. dec.	Lg. dec.	Low	Rare	Very Poor	Very Poor			0	70
eastern hophornbeam; ironw	Ostrya virginiana	WSL	Low	0.8	0.1	0.2	Lg. inc.	Lg. inc.	High	Rare	Good	Good			2	71
ashe juniper	Juniperus ashei	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			0	72
slash pine	Pinus elliottii	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate ++	3	73
longleaf pine	Pinus palustris	NSH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate ++	Migrate ++	3	74
bald cypress	Taxodium distichum	NSH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate ++	3	75
pond cypress	Taxodium ascendens	NSH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	76
florida maple	Acer barbatum	NSL	Low	0	0	0	Unknown	New Habitat	High	Absent	Unknown	New Habitat		Migrate +	3	77
cittamwood/gum bumelia	Sideroxylon lanuginosum ssp.	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			0	78
water hickory	Carya aquatica	NSL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	79
pecan	Carya illinoensis	NSH	Low	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat		Migrate +	3	80
shellbark hickory	Carya laciniosa	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	81
shagbark hickory	Carya ovata	WSL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Likely +	Likely +	3	82
black hickory	Carya texana	NDL	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			0	83
sugarberry	Celtis laevigata	NDH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	84
eastern redbud	Cercis canadensis	NSL	Low	0	0	0	Unknown	Unknown	Medium	Modeled	Unknown	Unknown			2	85
honeylocust	Gleditsia triacanthos	NSH	Low	0	0	0	Unknown	New Habitat	High	Absent	Unknown	New Habitat			3	86
loblolly-bay	Gordonia lasianthus	NSH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	87
cucumbertree	Magnolia acuminata	NSL	Low	0	0	0	Unknown	Unknown	Medium	Modeled	Unknown	Unknown			0	88
bigleaf magnolia	Magnolia macrophylla	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	89
water tupelo	Nyssa aquatica	NSH	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	90
swamp tupelo	Nyssa biflora	NDH	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat	Migrate ++	Migrate ++	3	91
sourwood	Oxydendrum arboreum	NDL	High	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate ++		3	92
redbay	Persea borbonia	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	93
water elm	Planera aquatica	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			0	94



Section 232A

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Climate Change Atlas Tree Species

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Common Name	Scientific Name	Range	MR	%Cell	FIAsum	FIAiv	ChngCl45	ChngCl85	Adap	Abund	Capabil45	Capabil85	SHIFT45	SHIFT85	SSO	N
pin cherry	<i>Prunus pensylvanica</i>	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	95
turkey oak	<i>Quercus laevis</i>	NSH	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat		Migrate +	3	96
overcup oak	<i>Quercus lyrata</i>	NSL	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	97
water oak	<i>Quercus nigra</i>	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Likely +	Likely +	3	98
Nuttall oak	<i>Quercus texana</i>	NSH	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			0	99
live oak	<i>Quercus virginiana</i>	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	100
bluejack oak	<i>Quercus incana</i>	NSL	Low	0	0	0	Unknown	New Habitat	Medium	Absent	Unknown	New Habitat			3	101
winged elm	<i>Ulmus alata</i>	WDL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate ++	3	102
cedar elm	<i>Ulmus crassifolia</i>	NDH	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat			0	103