

	sq. km	sq. mi	FIA Plots
Area of Region	77,450	29,903	2,520

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		RCP45	RCP85	RCP45	RCP85	RCP45	RCP85			
Ash	4			18	25	Increase	25	31	Very Good	11	12	Likely	0	1
Hickory	8			39	60	No Change	20	23	Good	14	17	Infill	14	21
Maple	3	Abundant	6	41	16	Decrease	38	29	Fair	8	9	Migrate	0	1
Oak	20	Common	14	7		New	6	10	Poor	21	23		14	23
Pine	9	Rare	70			Unknown	16	12	Very Poor	29	20			
Other	46	Absent	15						FIA Only	6	6			
	90		105				105	105	Unknown	9	5			
										98	92			

Potential Changes in Climate Variables

Temperature (°F)

	Scenario	2009	2039	2069	2099	
Annual Average	CCSM45	65.4	66.9	68.8	68.8	
	CCSM85	65.4	67.2	69.4	71.9	
	GFDL45	65.4	68.1	70.0	70.7	
	GFDL85	65.4	68.0	71.0	74.4	
	HAD45	65.4	67.3	69.8	71.2	
HAD85	65.4	67.7	70.8	74.5		
Growing Season (May—Sep)	CCSM45	77.6	78.9	80.4	80.7	
	CCSM85	77.6	79.0	81.3	84.2	
	GFDL45	77.6	80.3	82.1	83.3	
	GFDL85	77.6	80.3	83.4	87.2	
	HAD45	77.6	80.2	82.3	83.8	
HAD85	77.6	80.3	84.4	87.9		
Coldest Month (Average)	CCSM45	47.0	49.2	50.1	49.9	
	CCSM85	47.0	49.0	50.0	51.3	
	GFDL45	47.0	49.8	50.1	50.7	
	GFDL85	47.0	49.0	50.1	50.9	
	HAD45	47.0	47.1	48.5	49.2	
HAD85	47.0	47.8	48.8	50.4		
Warmest Month (Average)	CCSM45	81.6	83.0	83.9	84.0	
	CCSM85	81.6	83.2	84.6	86.1	
	GFDL45	81.6	83.7	84.5	85.4	
	GFDL85	81.6	84.0	85.5	87.7	
	HAD45	81.6	84.6	85.7	86.3	
HAD85	81.6	84.8	87.3	88.9		

Precipitation (in)

	Scenario	2009	2039	2069	2099	
Annual Total	CCSM45	49.0	52.9	54.4	55.7	
	CCSM85	49.0	52.6	55.2	58.4	
	GFDL45	49.0	55.2	57.4	59.9	
	GFDL85	49.0	53.6	60.1	58.8	
	HAD45	49.0	48.4	48.9	50.3	
HAD85	49.0	50.3	47.1	47.2		
Growing Season (May—Sep)	CCSM45	25.4	29.0	29.5	29.8	
	CCSM85	25.4	27.3	29.8	31.0	
	GFDL45	25.4	30.5	31.9	32.9	
	GFDL85	25.4	29.4	34.5	34.2	
	HAD45	25.4	24.9	24.7	24.2	
HAD85	25.4	25.5	22.0	20.7		

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.

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Section 232C

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	80.9	3176.1	32.4	No change	No change	Medium	Abundant	Good	Good			1	1
slash pine	Pinus elliotii	NDH	High	44.5	1938.0	36.1	Sm. inc.	Sm. inc.	Medium	Abundant	Very Good	Very Good			1	2
sweetgum	Liquidambar styraciflua	WDH	High	70.3	757.2	8.5	No change	No change	Medium	Abundant	Good	Good			1	3
red maple	Acer rubrum	WDH	High	78.4	679.0	7.0	No change	No change	High	Abundant	Very Good	Very Good			1	4
swamp tupelo	Nyssa biflora	NDH	Medium	68.1	592.6	7.2	Sm. inc.	Sm. inc.	Low	Abundant	Good	Good			1	5
water oak	Quercus nigra	WDH	High	68.6	524.0	6.0	Sm. inc.	Lg. inc.	Medium	Abundant	Very Good	Very Good			1	6
longleaf pine	Pinus palustris	NSH	Medium	25	313.0	10.5	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	7
laurel oak	Quercus laurifolia	NDH	Medium	54.6	306.2	4.8	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	8
pond pine	Pinus serotina	NSH	Medium	19.8	233.5	9.9	No change	No change	Low	Common	Poor	Poor			0	9
pond cypress	Taxodium ascendens	NSH	Medium	27.3	226.8	7.0	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	10
loblolly-bay	Gordonia lasianthus	NSH	Medium	24.4	146.0	5.6	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	11
live oak	Quercus virginiana	NDH	High	22.7	133.5	5.0	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good	Infill ++	Infill ++	1	12
redbay	Persea borbonia	NSL	Low	50.3	124.6	2.1	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good			1	13
sweetbay	Magnolia virginiana	NSL	Medium	40	118.3	2.3	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	14
yellow-poplar	Liriodendron tulipifera	WDH	High	16.9	90.6	3.8	Lg. dec.	Lg. dec.	High	Common	Fair	Fair			1	15
bald cypress	Taxodium distichum	NSH	Medium	16.8	74.9	3.7	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	16
green ash	Fraxinus pennsylvanica	WSH	Low	20	72.4	2.9	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	17
water tupelo	Nyssa aquatica	NSH	Medium	9.1	71.3	6.4	No change	No change	Low	Common	Poor	Poor	Infill +	Infill +	0	18
willow oak	Quercus phellos	NSL	Low	17.7	59.5	3.0	Sm. inc.	Lg. inc.	Medium	Common	Good	Very Good			1	19
blackgum	Nyssa sylvatica	WDL	Medium	25.5	56.3	1.7	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	20
black cherry	Prunus serotina	WDL	Medium	19.5	46.7	1.9	Lg. inc.	Lg. inc.	Low	Rare	Fair	Fair			1	21
southern red oak	Quercus falcata	WDL	Medium	11.5	46.3	2.4	Lg. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	Infill ++	1	22
turkey oak	Quercus laevis	NSH	Medium	5.5	44.5	5.2	No change	No change	High	Rare	Fair	Fair	Infill +	Infill +	1	23
American holly	Ilex opaca	NSL	Medium	23.3	38.7	1.2	Sm. inc.	Sm. inc.	Medium	Rare	Fair	Fair			1	24
black willow	Salix nigra	NSH	Low	8.4	38.0	4.3	No change	No change	Low	Rare	Very Poor	Very Poor			0	25
American hornbeam; musclev	Carpinus caroliniana	WSL	Low	12.6	33.2	2.0	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			1	26
mockernut hickory	Carya alba	WDL	Medium	12.5	30.2	1.9	Sm. inc.	Sm. inc.	High	Rare	Good	Good			1	27
post oak	Quercus stellata	WDH	High	14.1	29.4	1.5	Lg. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	Infill ++	1	28
white oak	Quercus alba	WDH	Medium	11.6	27.3	1.9	No change	Sm. inc.	High	Rare	Fair	Good	Infill +	Infill ++	1	29
swamp chestnut oak	Quercus michauxii	NSL	Low	11.4	26.5	2.1	Sm. dec.	No change	Medium	Rare	Very Poor	Poor		Infill +	1	30
American elm	Ulmus americana	WDH	Medium	11.3	25.3	1.6	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	1	31
pumpkin ash	Fraxinus profunda	NSH	FIA	2	24.2	8.4	Unknown	Unknown	NA	Rare	FIA Only	FIA Only			0	32
cherrybark oak; swamp red o.	Quercus pagoda	NSL	Medium	7.4	22.8	2.9	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	33
sand pine	Pinus clausa	NDH	High	0.8	19.5	12.0	No change	No change	Low	Rare	Very Poor	Very Poor			2	34
cabbage palmetto	Sabal palmetto	NDH	Medium	3.7	15.4	7.6	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			0	35
ogeechee tupelo	Nyssa ogeche	NSLX	FIA	3.9	13.9	3.5	Unknown	Unknown	Low	Rare	FIA Only	FIA Only			0	36
pignut hickory	Carya glabra	WDL	Medium	5.2	13.1	1.7	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			2	37
southern magnolia	Magnolia grandiflora	NSL	Low	4.6	13.0	2.2	No change	Sm. inc.	Medium	Rare	Poor	Fair	Infill +	Infill +	1	38
sugarberry	Celtis laevigata	NDH	Medium	3.8	12.8	2.4	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	2	39
river birch	Betula nigra	NSL	Low	4.1	12.7	2.7	No change	Sm. inc.	Medium	Rare	Poor	Fair	Infill +	Infill +	1	40
slippery elm	Ulmus rubra	WSL	Low	7.4	12.7	1.4	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	41
eastern redcedar	Juniperus virginiana	WDH	Medium	3.5	12.4	3.7	Sm. dec.	No change	Medium	Rare	Very Poor	Poor		Infill +	2	42
flowering dogwood	Cornus florida	WDL	Medium	7.1	10.5	1.2	Sm. dec.	No change	Medium	Rare	Very Poor	Poor			1	43
common persimmon	Diospyros virginiana	NSL	Low	8.1	10.1	1.0	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor			1	44
water hickory	Carya aquatica	NSL	Medium	3.7	9.1	1.5	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	45
overcup oak	Quercus lyrata	NSL	Medium	4.1	7.5	1.5	No change	No change	Low	Rare	Very Poor	Very Poor			2	46
sycamore	Platanus occidentalis	NSL	Low	1.9	6.8	2.4	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	47



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scarlet oak	Quercus coccinea	WDL	Medium	2	5.8	3.1	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	48
water elm	Planera aquatica	NSL	Low	1.7	5.4	3.2	Sm. dec.	No change	Medium	Rare	Very Poor	Poor		Infill +	2	49
spruce pine	Pinus glabra	NSL	Low	2.2	5.3	1.9	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	50
winged elm	Ulmus alata	WDL	Medium	3.5	5.3	1.1	Sm. inc.	Lg. inc.	Medium	Rare	Fair	Good		Infill ++	2	51
Atlantic white-cedar	Chamaecyparis thyoides	NSH	Low	0.8	4.8	2.6	Sm. dec.	Sm. dec.	Low	Rare	Very Poor	Very Poor			0	52
sassafras	Sassafras albidum	WSL	Low	3.9	4.7	0.8	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	53
blackjack oak	Quercus marilandica	NSL	Medium	1.7	4.5	2.1	No change	No change	High	Rare	Fair	Fair		Infill +	2	54
shortleaf pine	Pinus echinata	WDH	High	1.2	4.4	3.1	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	55
Carolina ash	Fraxinus caroliniana	NSL	FIA	1.3	3.9	2.7	Unknown	Unknown	NA	Rare	FIA Only	FIA Only			0	56
pecan	Carya illinoensis	NSH	Low	1.8	3.9	2.4	Sm. dec.	No change	Low	Rare	Very Poor	Very Poor			2	57
sourwood	Oxydendrum arboreum	NDL	High	1.6	3.5	1.0	Lg. dec.	Lg. dec.	High	Rare	Poor	Poor			0	58
eastern cottonwood	Populus deltoides	NSH	Low	1.3	3.3	1.8	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	59
boxelder	Acer negundo	WSH	Low	1.5	3.2	1.9	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor		Infill +	2	60
Virginia pine	Pinus virginiana	NDH	High	1.3	2.7	1.4	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	61
eastern hophornbeam; ironw	Ostrya virginiana	WSL	Low	2.3	2.6	0.9	Sm. dec.	No change	High	Rare	Poor	Fair		Infill +	2	62
hackberry	Celtis occidentalis	WDH	Medium	0.7	2.3	2.8	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor			0	63
red mulberry	Morus rubra	NSL	Low	2.3	2.2	1.0	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			2	64
American beech	Fagus grandifolia	WDH	High	1.2	2.0	1.4	Sm. dec.	No change	Medium	Rare	Very Poor	Poor			2	65
sand hickory	Carya pallida	NSL	FIA	0.6	2.0	3.0	Unknown	Unknown	NA	Rare	FIA Only	FIA Only			0	66
bluejack oak	Quercus incana	NSL	Low	1.8	1.7	0.6	No change	Lg. inc.	Medium	Rare	Poor	Good			2	67
black oak	Quercus velutina	WDH	High	1.7	1.5	0.8	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	68
Shumard oak	Quercus shumardii	NSL	Low	1	1.4	2.4	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor			0	69
bitternut hickory	Carya cordiformis	WSL	Low	0.4	1.2	3.1	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor			0	70
white ash	Fraxinus americana	WDL	Medium	0.5	0.8	1.6	Lg. dec.	Lg. dec.	Low	Rare	Very Poor	Very Poor			0	71
waterlocust	Gleditsia aquatica	NSLX	FIA	0.2	0.8	2.8	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	72
florida maple	Acer barbatum	NSL	Low	0.4	0.6	0.8	Lg. dec.	Lg. dec.	High	Rare	Poor	Poor			0	73
black locust	Robinia pseudoacacia	NDH	Low	0.5	0.6	1.8	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	74
American basswood	Tilia americana	WSL	Medium	0	0.6	1.2	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	75
wild plum	Prunus americana	NSLX	FIA	0.4	0.4	0.2	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	76
black walnut	Juglans nigra	WDH	Low	0.4	0.4	1.0	Lg. dec.	Very Lg. dec.	Medium	Rare	Very Poor	Lost			0	77
eastern white pine	Pinus strobus	WDH	High	0.1	0.3	2.6	Sm. dec.	Sm. dec.	Low	Rare	Very Poor	Very Poor			0	78
swamp white oak	Quercus bicolor	NSL	Low	0.4	0.3	0.8	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	79
ailanthus	Ailanthus altissima	NSL	FIA	0.2	0.3	0.6	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	80
northern red oak	Quercus rubra	WDH	Medium	0.5	0.3	0.6	Lg. dec.	Lg. dec.	High	Rare	Poor	Poor			0	81
eastern redbud	Cercis canadensis	NSL	Low	0.7	0.3	0.3	Lg. dec.	Very Lg. dec.	Medium	Rare	Very Poor	Lost			0	82
shagbark hickory	Carya ovata	WSL	Medium	0.1	0.2	1.8	Sm. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	83
honeylocust	Gleditsia triacanthos	NSH	Low	0.3	0.2	0.8	No change	Lg. inc.	High	Rare	Fair	Good			2	84
chinkapin oak	Quercus muehlenbergii	NSL	Medium	0.2	0.2	0.7	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	85
serviceberry	Amelanchier spp.	NSL	Low	0.2	0.1	0.3	No change	Sm. inc.	Medium	Rare	Poor	Fair			0	86
shellbark hickory	Carya laciniosa	NSL	Low	0.1	0.1	0.6	Sm. dec.	No change	Medium	Rare	Very Poor	Poor			0	87
chestnut oak	Quercus prinus	NDH	High	0.1	0.1	0.6	Sm. dec.	Lg. dec.	High	Rare	Poor	Poor			0	88
pawpaw	Asimina triloba	NSL	Low	0	0.1	0.0	Sm. dec.	No change	Medium	Rare	Very Poor	Poor			0	89
Osage-orange	Maclura pomifera	NDH	Medium	0.2	0.0	0.3	Lg. dec.	Lg. dec.	High	Rare	Poor	Poor			0	90
ashe juniper	Juniperus ashei	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			0	91
striped maple	Acer pensylvanicum	NSL	Medium	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	92
silver maple	Acer saccharinum	NSH	Low	0	0	0	Unknown	New Habitat	High	Absent	Unknown	New Habitat		Migrate +	3	93
gray birch	Betula populifolia	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			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
cittamwood/gum bumelia	<i>Sideroxylon lanuginosum</i> ssp.	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			2	95
black hickory	<i>Carya texana</i>	NDL	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	96
black ash	<i>Fraxinus nigra</i>	WSH	Medium	0	0	0	Unknown	New Habitat	Low	Absent	Unknown	New Habitat			3	97
silverbell	<i>Halesia</i> spp.	NSL	Low	0	0	0	Unknown	New Habitat	Medium	Absent	Unknown	New Habitat			3	98
cucumbertree	<i>Magnolia acuminata</i>	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	99
bigleaf magnolia	<i>Magnolia macrophylla</i>	NSL	Low	0	0	0	Unknown	New Habitat	Medium	Absent	Unknown	New Habitat	Likely +		3	100
mountain or Fraser magnolia	<i>Magnolia fraseri</i>	NSL	Low	0	0	0	Unknown	Unknown	Low	Absent	Unknown	Unknown			0	101
pin cherry	<i>Prunus pensylvanica</i>	NSL	Low	0	0	0	New Habitat	Unknown	Medium	Absent	New Habitat	Unknown			3	102
Nuttall oak	<i>Quercus texana</i>	NSH	Medium	0	0	0	Unknown	New Habitat	High	Absent	Unknown	New Habitat			0	103
American mountain-ash	<i>Sorbus americana</i>	NSL	Low	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat			0	104
cedar elm	<i>Ulmus crassifolia</i>	NDH	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat			3	105