

	sq. km	sq. mi	FIA Plots
Area of Region	45,322	17,499	339

**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	12	20	Increase	18	21	Very Good	1	1	Likely	0	0
Hickory	7			Medium	23	41	No Change	16	16	Good	14	17	Infill	32	33
Maple	4	Abundant	0	Low	30	8	Decrease	18	15	Fair	15	14	Migrate	5	6
Oak	12	Common	13	FIA	7		New	9	9	Poor	8	9			
Pine	0	Rare	46				Unknown	11	11	Very Poor	13	10			
Other	33	Absent	13							FIA Only	4	4			
	<b>59</b>		<b>72</b>		<b>72</b>	<b>69</b>		<b>72</b>	<b>72</b>	Unknown	4	4			
											<b>59</b>	<b>59</b>			

**Potential Changes in Climate Variables**

**Temperature (°F)**

	Scenario	2009	2039	2069	2099	
Annual Average	CCSM45	56.0	57.8	59.7	60.1	
	CCSM85	56.0	58.6	60.8	63.6	
	GFDL45	56.0	61.4	61.1	62.2	
	GFDL85	56.0	58.9	61.8	65.9	
	HAD45	56.0	58.4	61.3	62.7	
	HAD85	56.0	58.7	63.5	67.0	
Growing Season (May—Sep)	CCSM45	73.1	75.3	77.1	77.6	
	CCSM85	73.1	76.3	78.4	81.7	
	GFDL45	73.1	80.2	79.3	81.3	
	GFDL85	73.1	76.8	80.2	85.4	
	HAD45	73.1	75.5	77.9	79.4	
	HAD85	73.1	76.0	81.5	84.6	
Coldest Month (Average)	CCSM45	29.1	31.1	32.4	33.0	
	CCSM85	29.1	31.7	32.6	34.3	
	GFDL45	29.1	33.3	33.7	33.7	
	GFDL85	29.1	31.5	32.7	33.7	
	HAD45	29.1	30.4	33.2	33.1	
	HAD85	29.1	32.4	34.8	36.7	
Warmest Month (Average)	CCSM45	79.6	82.1	83.1	83.7	
	CCSM85	79.6	83.3	84.5	86.2	
	GFDL45	79.6	83.9	85.3	86.7	
	GFDL85	79.6	83.9	85.4	89.4	
	HAD45	79.6	82.2	83.9	84.6	
	HAD85	79.6	83.7	86.5	88.0	

**Precipitation (in)**

	Scenario	2009	2039	2069	2099	
Annual Total	CCSM45	42.4	40.4	42.7	41.5	
	CCSM85	42.4	41.6	42.6	43.0	
	GFDL45	42.4	46.0	47.5	45.9	
	GFDL85	42.4	46.1	52.8	50.9	
	HAD45	42.4	44.3	44.4	44.8	
	HAD85	42.4	44.3	40.7	44.2	
Growing Season (May—Sep)	CCSM45	23.5	21.5	22.7	21.7	
	CCSM85	23.5	22.5	22.3	22.2	
	GFDL45	23.5	25.9	25.0	24.9	
	GFDL85	23.5	25.9	29.0	27.1	
	HAD45	23.5	23.7	24.0	24.2	
	HAD85	23.5	24.0	20.4	21.5	

**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 251E

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
Osage-orange	Maclura pomifera	NDH	Medium	59.9	268.6	16.6	No change	No change	High	Common	Good	Good	Infill ++	Infill ++	1	1
American elm	Ulmus americana	WDH	Medium	74.2	264.2	11.0	No change	No change	Medium	Common	Fair	Fair	Infill +	Infill +	1	2
hackberry	Celtis occidentalis	WDH	Medium	65.9	216.7	10.2	No change	No change	High	Common	Good	Good	Infill ++	Infill ++	1	3
post oak	Quercus stellata	WDH	High	17	192.0	12.5	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good	Infill ++	Infill ++	2	4
black walnut	Juglans nigra	WDH	Low	56.7	160.6	9.2	Sm. dec.	No change	Medium	Common	Poor	Fair	Infill +	Infill +	1	5
eastern redcedar	Juniperus virginiana	WDH	Medium	37.3	126.2	11.3	Sm. inc.	Sm. inc.	Medium	Common	Good	Good	Infill ++	Infill ++	1	6
honeylocust	Gleditsia triacanthos	NSH	Low	49.1	115.4	7.9	No change	No change	High	Common	Good	Good	Infill ++	Infill ++	1	7
green ash	Fraxinus pennsylvanica	WDH	Low	45.6	107.4	9.0	Sm. inc.	Sm. inc.	Medium	Common	Good	Good	Infill ++	Infill ++	1	8
black oak	Quercus velutina	WDH	High	14	84.1	7.0	Sm. inc.	No change	Medium	Common	Good	Fair	Infill ++	Infill ++	2	9
shagbark hickory	Carya ovata	WSL	Medium	23.8	77.2	6.3	Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor	Infill +	Infill +	0	10
silver maple	Acer saccharinum	NSH	Low	13	76.8	10.1	Sm. dec.	Sm. dec.	High	Common	Fair	Fair	Infill +	Infill +	2	11
red mulberry	Morus rubra	NSL	Low	39.1	71.9	4.5	No change	Sm. dec.	Medium	Common	Fair	Poor	Infill +	Infill +	1	12
pin oak	Quercus palustris	NSH	Low	20.2	68.5	9.0	Sm. dec.	Sm. dec.	Low	Common	Poor	Poor	Infill +	Infill +	0	13
northern red oak	Quercus rubra	WDH	Medium	20.1	48.5	5.5	No change	Sm. dec.	High	Rare	Fair	Poor	Infill +	Infill +	1	14
chinkapin oak	Quercus muehlenbergii	NSL	Medium	18.5	46.3	5.2	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	15
sycamore	Platanus occidentalis	NSL	Low	15.1	44.4	7.5	Sm. inc.	Sm. inc.	Medium	Rare	Fair	Fair	Infill +	Infill +	2	16
pecan	Carya illinoensis	NSH	Low	22.8	40.9	7.5	Lg. inc.	Lg. inc.	Low	Rare	Fair	Fair	Infill +	Infill +	2	17
boxelder	Acer negundo	WSH	Low	18.6	40.5	6.8	Sm. dec.	Sm. inc.	High	Rare	Poor	Good	Infill +	Infill ++	1	18
slippery elm	Ulmus rubra	WSL	Low	23.6	39.9	3.5	No change	Sm. inc.	Medium	Rare	Poor	Fair	Infill +	Infill +	1	19
bitternut hickory	Carya cordiformis	WSL	Low	27.4	38.0	4.7	Sm. inc.	Sm. inc.	High	Rare	Good	Good	Infill ++	Infill ++	1	20
white oak	Quercus alba	WDH	Medium	4.7	37.2	7.3	No change	No change	High	Rare	Fair	Fair	Infill +	Infill +	2	21
black willow	Salix nigra	NSH	Low	8.6	27.6	8.6	No change	No change	Low	Rare	Very Poor	Very Poor			2	22
shingle oak	Quercus imbricaria	NDH	Medium	10.5	25.9	7.5	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			2	23
eastern redbud	Cercis canadensis	NSL	Low	22.1	25.3	2.9	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	1	24
common persimmon	Diospyros virginiana	NSL	Low	17.7	25.1	3.8	Lg. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	Infill ++	1	25
sugar maple	Acer saccharum	WDH	High	2.4	23.5	14.3	No change	No change	High	Rare	Fair	Fair	Infill +	Infill +	2	26
mockernut hickory	Carya alba	WDL	Medium	6.3	22.9	4.9	No change	No change	High	Rare	Fair	Fair	Infill +	Infill +	2	27
white ash	Fraxinus americana	WDL	Medium	18.4	20.6	3.6	Lg. inc.	Lg. inc.	Low	Rare	Fair	Fair	Infill +	Infill +	1	28
black cherry	Prunus serotina	WDL	Medium	24.3	19.3	2.2	Sm. inc.	Sm. inc.	Low	Rare	Poor	Poor	Infill +	Infill +	1	29
blackjack oak	Quercus marilandica	NSL	Medium	7.9	18.4	4.1	Lg. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	Infill ++	2	30
black hickory	Carya texana	NDL	High	5.1	17.3	2.7	Sm. inc.	Sm. inc.	Medium	Rare	Fair	Fair	Infill +	Infill +	2	31
bur oak	Quercus macrocarpa	NDH	Medium	16.4	16.0	4.5	Sm. inc.	No change	High	Rare	Good	Fair	Infill ++	Infill +	2	32
sugarberry	Celtis laevigata	NDH	Medium	6.4	15.0	9.6	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	33
eastern cottonwood	Populus deltoides	NSH	Low	9.4	13.2	6.8	Sm. dec.	No change	Medium	Rare	Very Poor	Poor		Infill +	2	34
river birch	Betula nigra	NSL	Low	2	12.5	8.9	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			2	35
black locust	Robinia pseudoacacia	NDH	Low	2.9	10.7	6.4	Sm. dec.	No change	Medium	Rare	Very Poor	Poor		Infill +	2	36
shellbark hickory	Carya laciniosa	NSL	Low	5.3	10.3	7.3	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	37
Shumard oak	Quercus shumardii	NSL	Low	7.4	6.5	3.4	No change	Sm. inc.	High	Rare	Fair	Good	Infill +	Infill ++	2	38
white mulberry	Morus alba	NSL	FIA	0.4	5.4	5.2	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	39
Kentucky coffeetree	Gymnocladus dioicus	NSLX	FIA	6.5	5.1	4.7	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			2	40
wild plum	Prunus americana	NSLX	FIA	4.1	4.5	2.3	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	41
northern catalpa	Catalpa speciosa	NSHX	FIA	0.8	2.8	2.6	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	42
red maple	Acer rubrum	WDH	High	2.1	2.7	3.7	No change	No change	High	Rare	Fair	Fair	Infill +	Infill +	2	43
Siberian elm	Ulmus pumila	NDH	FIA	1.9	2.0	7.9	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	44
pawpaw	Asimina triloba	NSL	Low	4.2	2.0	2.2	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	45
American basswood	Tilia americana	WSL	Medium	2.3	1.8	2.8	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	46
southern red oak	Quercus falcata	WDL	Medium	0.2	1.7	7.7	Lg. inc.	Lg. inc.	High	Rare	Good	Good			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
swamp white oak	Quercus bicolor	NSL	Low	2	1.6	2.7	Very Lg. dec.	Very Lg. dec.	Medium	Rare	Lost	Lost			0	48
eastern hophornbeam; ironw	Ostrya virginiana	WSL	Low	2.1	1.5	1.1	No change	Sm. inc.	High	Rare	Fair	Good			2	49
Ohio buckeye	Aesculus glabra	NSL	Low	2.9	0.9	1.2	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	50
sassafras	Sassafras albidum	WSL	Low	0.2	0.6	2.1	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			2	51
chokecherry	Prunus virginiana	NSLX	FIA	0.9	0.6	11.0	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	52
blue ash	Fraxinus quadrangulata	NSL	Low	0.5	0.6	0.6	Lg. dec.	Lg. dec.	Low	Rare	Very Poor	Very Poor			0	53
cittamwood/gum bumelia	Sideroxylon lanuginosum ssp.	NSL	Low	1.1	0.4	0.5	Lg. inc.	Lg. inc.	High	Rare	Good	Good			2	54
winged elm	Ulmus alata	WDL	Medium	0.3	0.3	0.1	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	55
flowering dogwood	Cornus florida	WDL	Medium	1	0.3	0.5	Sm. inc.	Lg. inc.	Medium	Rare	Fair	Good	Infill +		2	56
pignut hickory	Carya glabra	WDL	Medium	0.1	0.2	0.5	Sm. dec.	Lg. inc.	Medium	Rare	Very Poor	Good			2	57
serviceberry	Amelanchier spp.	NSL	Low	0.2	0.0	0.1	No change	No change	Medium	Rare	Poor	Poor			0	58
ailanthus	Ailanthus altissima	NSL	FIA	0.9	0.0	0.5	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	59
ashe juniper	Juniperus ashei	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			0	60
shortleaf pine	Pinus echinata	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate ++	Migrate ++	3	61
loblolly pine	Pinus taeda	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate ++	Migrate ++	3	62
yellow birch	Betula alleghaniensis	NDL	High	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	63
American hornbeam; muscle	Carpinus caroliniana	WSL	Low	0	0	0	Unknown	New Habitat	Medium	Absent	Unknown	New Habitat			3	64
black ash	Fraxinus nigra	WSH	Medium	0	0	0	Unknown	Unknown	Low	Absent	Unknown	Unknown			0	65
sweetgum	Liquidambar styraciflua	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +		3	66
bigleaf magnolia	Magnolia macrophylla	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	67
blackgum	Nyssa sylvatica	WDL	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +	Migrate ++	3	68
pin cherry	Prunus pensylvanica	NSL	Low	0	0	0	New Habitat	Unknown	Medium	Absent	New Habitat	Unknown			3	69
water oak	Quercus nigra	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate ++	3	70
live oak	Quercus virginiana	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	71
cedar elm	Ulmus crassifolia	NDH	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat	Migrate ++	Migrate ++	3	72

