

	sq. km	sq. mi	FIA Plots
Area of Region	14,619	5,644.4	335

**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	22	23	Increase	15	16	Very Good	5	4	Likely	0	0
Hickory	3			Medium	32	47	No Change	15	12	Good	14	14	Infill	13	13
Maple	6	Abundant	6	Low	30	17	Decrease	21	23	Fair	10	11	Migrate	7	10
Oak	6	Common	23	FIA	5		New	28	30	Poor	10	10			
Pine	4	Rare	27				Unknown	10	8	Very Poor	12	12			
Other	34	Absent	32							FIA Only	3	3			
	<b>56</b>		<b>88</b>		<b>89</b>	<b>87</b>		<b>89</b>	<b>89</b>	Unknown	5	3			
											<b>59</b>	<b>57</b>			

**Potential Changes in Climate Variables**

**Temperature (°F)**

	Scenario	2009	2039	2069	2099	
Annual Average	CCSM45	44.8	46.7	49.4	49.3	
	CCSM85	44.8	47.3	50.1	53.5	
	GFDL45	44.8	48.6	51.6	53.1	
	GFDL85	44.8	48.6	53.1	58.4	
	HAD45	44.8	48.1	51.5	53.3	
Growing Season (May—Sep)	CCSM45	63.3	65.4	67.4	67.7	
	CCSM85	63.3	65.7	68.3	72.3	
	GFDL45	63.3	67.4	70.8	72.5	
	GFDL85	63.3	67.6	72.4	78.0	
	HAD45	63.3	66.5	69.4	71.8	
Coldest Month Average	CCSM45	15.0	16.7	19.3	19.3	
	CCSM85	15.0	17.9	19.4	22.0	
	GFDL45	15.0	18.3	20.9	22.2	
	GFDL85	15.0	19.4	21.8	25.1	
	HAD45	15.0	17.8	21.2	21.6	
Warmest Month Average	CCSM45	69.6	71.9	73.3	73.4	
	CCSM85	69.6	72.5	74.2	76.4	
	GFDL45	69.6	72.8	75.0	76.3	
	GFDL85	69.6	73.8	76.7	79.6	
	HAD45	69.6	73.1	74.5	76.1	
HAD85	69.6	72.9	75.7	80.3		

**Precipitation (in)**

	Scenario	2009	2039	2069	2099	
Annual Total	CCSM45	38.9	38.0	37.5	40.6	
	CCSM85	38.9	39.8	39.4	39.9	
	GFDL45	38.9	42.8	44.3	43.5	
	GFDL85	38.9	40.8	43.0	44.3	
	HAD45	38.9	41.4	42.8	43.1	
Growing Season (May—Sep)	CCSM45	18.4	18.2	16.8	18.5	
	CCSM85	18.4	18.4	17.9	16.8	
	GFDL45	18.4	19.1	18.1	18.1	
	GFDL85	18.4	18.5	18.0	16.6	
	HAD45	18.4	19.2	18.1	19.2	
HAD85	18.4	19.0	17.4	18.7		

**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-DPC30 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 211E

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
red maple	Acer rubrum	WDH	High	76.1	1362.8	11.8	No change	Sm. dec.	High	Abundant	Very Good	Good			1	1
sugar maple	Acer saccharum	WDH	High	58.5	1019.4	9.7	No change	Sm. dec.	High	Abundant	Very Good	Good			1	2
eastern white pine	Pinus strobus	WDH	High	52.5	964.9	12.6	Sm. dec.	Sm. dec.	Low	Abundant	Fair	Fair			0	3
American elm	Ulmus americana	WDH	Medium	71.2	862.4	9.2	Sm. dec.	Sm. dec.	Medium	Abundant	Fair	Fair			0	4
eastern hemlock	Tsuga canadensis	NSH	High	45.7	730.6	10.0	Sm. dec.	Lg. dec.	Low	Abundant	Fair	Poor			0	5
white ash	Fraxinus americana	WDL	Medium	68.7	614.7	5.8	No change	No change	Low	Abundant	Fair	Fair			0	6
black cherry	Prunus serotina	WDL	Medium	54.9	452.4	5.5	Sm. inc.	No change	Low	Common	Fair	Poor			1	7
northern white-cedar	Thuja occidentalis	WSH	High	32.3	421.3	11.2	Sm. dec.	Sm. dec.	Medium	Common	Poor	Poor			0	8
quaking aspen	Populus tremuloides	WDH	High	41.1	377.3	6.1	No change	No change	Medium	Common	Fair	Fair			1	9
American beech	Fagus grandifolia	WDH	High	41.7	265.7	3.4	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	10
American basswood	Tilia americana	WSL	Medium	35.4	221.2	4.6	Sm. inc.	No change	Medium	Common	Good	Fair			1	11
northern red oak	Quercus rubra	WDH	Medium	35	212.2	4.1	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	12
yellow birch	Betula alleghaniensis	NDL	High	38.4	208.3	3.1	Sm. dec.	Sm. dec.	Medium	Common	Poor	Poor			0	13
eastern hophornbeam; ironw	Ostrya virginiana	WSL	Low	46.9	199.2	3.0	No change	Sm. dec.	High	Common	Good	Fair			1	14
black ash	Fraxinus nigra	WSH	Medium	28.5	194.1	5.3	Lg. dec.	Lg. dec.	Low	Common	Very Poor	Very Poor			0	15
gray birch	Betula populifolia	NSL	Low	32.6	192.3	4.6	Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor			0	16
green ash	Fraxinus pennsylvanica	WSH	Low	19.8	151.9	6.4	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	17
bitternut hickory	Carya cordiformis	WSL	Low	29.7	149.2	4.8	Sm. dec.	No change	High	Common	Fair	Good			1	18
paper birch	Betula papyrifera	WDH	High	28	148.5	2.7	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	19
bigtooth aspen	Populus grandidentata	NSL	Medium	18.8	120.1	3.7	Sm. inc.	No change	Medium	Common	Good	Fair			1	20
balsam fir	Abies balsamea	NDH	High	15.8	101.8	3.2	No change	No change	Low	Common	Poor	Poor			0	21
boxelder	Acer negundo	WSH	Low	3.3	97.6	14.0	No change	No change	High	Common	Good	Good	Infill ++	Infill ++	1	22
red pine	Pinus resinosa	NSH	Medium	5.9	91.2	6.7	Sm. dec.	Sm. dec.	Low	Common	Poor	Poor	Infill +	Infill +	2	23
bur oak	Quercus macrocarpa	NDH	Medium	11.5	90.7	7.7	Lg. dec.	Lg. dec.	High	Common	Fair	Fair	Infill +	Infill +	2	24
silver maple	Acer saccharinum	NSH	Low	5.4	89.9	14.2	No change	No change	High	Common	Good	Good	Infill ++	Infill ++	1	25
black locust	Robinia pseudoacacia	NDH	Low	6.7	74.5	9.0	No change	Sm. inc.	Medium	Common	Fair	Good	Infill +	Infill ++	1	26
eastern redcedar	Juniperus virginiana	WDH	Medium	6.3	74.3	6.3	Sm. inc.	Lg. inc.	Medium	Common	Good	Very Good	Infill ++	Infill ++	2	27
sweet birch	Betula lenta	NDH	High	8.8	70.1	3.3	No change	No change	Low	Common	Poor	Poor	Infill +	Infill +	2	28
shagbark hickory	Carya ovata	WSL	Medium	11	69.0	3.8	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good	Infill ++	Infill ++	1	29
pin cherry	Prunus pennsylvanica	NSL	Low	6.9	49.7	3.4	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	30
red spruce	Picea rubens	NDH	High	8	49.0	2.4	Sm. dec.	Sm. dec.	Low	Rare	Very Poor	Very Poor			0	31
serviceberry	Amelanchier spp.	NSL	Low	20.5	48.7	1.6	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	32
slippery elm	Ulmus rubra	WSL	Low	9.1	44.5	4.8	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	1	33
swamp white oak	Quercus bicolor	NSL	Low	6.6	40.7	6.3	No change	Sm. inc.	Medium	Rare	Poor	Fair	Infill +	Infill +	2	34
butternut	Juglans cinerea	NSLX	FIA	9.8	36.2	2.0	Unknown	Unknown	Low	Rare	FIA Only	FIA Only			0	35
eastern cottonwood	Populus deltoides	NSH	Low	2	32.3	8.3	No change	Sm. inc.	Medium	Rare	Poor	Fair	Infill +	Infill +	2	36
white oak	Quercus alba	WDH	Medium	9.4	31.1	1.9	Lg. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	Infill ++	2	37
Scots pine	Pinus sylvestris	NSH	FIA	4.1	28.0	4.0	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	38
tamarack (native)	Larix laricina	NSH	High	6.9	25.9	2.2	Sm. dec.	Sm. dec.	Low	Rare	Very Poor	Very Poor			0	39
white spruce	Picea glauca	NSL	Medium	1.9	24.7	11.8	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			2	40
black willow	Salix nigra	NSH	Low	1.5	24.0	11.6	Sm. dec.	No change	Low	Rare	Very Poor	Very Poor			2	41
American hornbeam; musclev	Carpinus caroliniana	WSL	Low	15.3	19.9	1.0	Lg. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	42
balsam poplar	Populus balsamifera	NSH	Medium	4.5	17.3	3.0	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	43
striped maple	Acer pensylvanicum	NSL	Medium	7.4	16.3	0.5	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	44
black oak	Quercus velutina	WDH	High	0.6	7.7	9.7	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	45
pignut hickory	Carya glabra	WDL	Medium	0.6	7.1	0.6	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	46
black walnut	Juglans nigra	WDH	Low	0.7	6.9	10.2	Lg. inc.	Lg. inc.	Medium	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
pitch pine	Pinus rigida	NSH	High	0.6	5.9	7.5	No change	Sm. inc.	Medium	Rare	Poor	Fair	Infill +	Infill +	2	48
chestnut oak	Quercus prinus	NDH	High	1.4	4.9	1.3	Lg. inc.	Lg. inc.	High	Rare	Good	Good			2	49
hackberry	Celtis occidentalis	WDH	Medium	0.7	4.9	7.1	Sm. inc.	Lg. inc.	High	Rare	Good	Good			2	50
Norway spruce	Picea abies	NSH	FIA	1	3.7	1.3	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	51
chokecherry	Prunus virginiana	NSLX	FIA	3.4	3.5	0.7	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	52
American mountain-ash	Sorbus americana	NSL	Low	0.8	1.1	0.5	Lg. dec.	Lg. dec.	Low	Rare	Very Poor	Very Poor			0	53
rock elm	Ulmus thomasii	NSLX	FIA	0.5	0.6	0.6	Unknown	Unknown	Low	Rare	FIA Only	FIA Only			0	54
black spruce	Picea mariana	NSH	High	0.6	0.3	0.4	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	55
mountain maple	Acer spicatum	NSL	Low	2.8	0.1	0.9	No change	Sm. dec.	High	Rare	Fair	Poor			1	56
Virginia pine	Pinus virginiana	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +	3	57
bald cypress	Taxodium distichum	NSH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			0	58
pawpaw	Asimina triloba	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	59
cittamwood/gum bumelia	Sideroxylon lanuginosum ssp.	NSL	Low	0	0	0	Unknown	New Habitat	High	Absent	Unknown	New Habitat			0	60
water hickory	Carya aquatica	NSL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			0	61
pecan	Carya illinoensis	NSH	Low	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat			0	62
black hickory	Carya texana	NDL	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			0	63
mockernut hickory	Carya alba	WDL	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	64
sugarberry	Celtis laevigata	NDH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			0	65
eastern redbud	Cercis canadensis	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	66
flowering dogwood	Cornus florida	WDL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate ++	3	67
common persimmon	Diospyros virginiana	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			3	68
honeylocust	Gleditsia triacanthos	NSH	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			3	69
American holly	Ilex opaca	NSL	Medium	0	0	0	Unknown	Unknown	Medium	Modeled	Unknown	Unknown			0	70
sweetgum	Liquidambar styraciflua	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate ++	3	71
yellow-poplar	Liriodendron tulipifera	WDH	High	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +	Migrate ++	3	72
Osage-orange	Maclura pomifera	NDH	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			3	73
southern magnolia	Magnolia grandiflora	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	74
bigleaf magnolia	Magnolia macrophylla	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	75
blackgum	Nyssa sylvatica	WDL	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	76
sycamore	Platanus occidentalis	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	77
scarlet oak	Quercus coccinea	WDL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	78
northern pin oak	Quercus ellipsoidalis	NSH	Medium	0	0	0	Unknown	New Habitat	High	Absent	Unknown	New Habitat			3	79
shingle oak	Quercus imbricaria	NDH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	80
overcup oak	Quercus lyrata	NSL	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat			0	81
blackjack oak	Quercus marilandica	NSL	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			3	82
chinkapin oak	Quercus muehlenbergii	NSL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	83
pin oak	Quercus palustris	NSH	Low	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	84
willow oak	Quercus phellos	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	85
Shumard oak	Quercus shumardii	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			0	86
post oak	Quercus stellata	WDH	High	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			3	87
sassafras	Sassafras albidum	WSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate ++	Migrate +	3	88
winged elm	Ulmus alata	WDL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			0	89

