

	sq. km	sq. mi	FIA Plots
Area of Region	24,309	9,385.6	894

**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	25	25	Increase	26	26	Very Good	6	6	Likely	3	3
Hickory	3			Medium	28	44	No Change	7	11	Good	12	18	Infill	12	13
Maple	6	Abundant	8	Low	30	16	Decrease	19	15	Fair	14	11	Migrate	5	11
Oak	6	Common	13	FIA	4		New	25	29	Poor	11	9			
Pine	5	Rare	35				Unknown	10	6	Very Poor	8	7			
Other	33	Absent	31							FIA Only	2	2			
	<b>56</b>		<b>87</b>		<b>87</b>	<b>85</b>		<b>87</b>	<b>87</b>	Unknown	6	2			
											<b>59</b>	<b>55</b>			

**Potential Changes in Climate Variables**

**Temperature (°F)**

	Scenario	2009	2039	2069	2099	
Annual Average	CCSM45	42.0	43.9	46.5	46.5	
	CCSM85	42.0	44.5	47.2	50.5	
	GFDL45	42.0	45.0	48.7	50.2	
	GFDL85	42.0	45.8	50.2	55.3	
	HAD45	42.0	45.2	48.6	50.3	
	HAD85	42.0	45.3	49.5	55.3	
Growing Season May—Sep	CCSM45	59.9	62.0	64.0	64.4	
	CCSM85	59.9	62.3	64.8	68.8	
	GFDL45	59.9	63.2	67.4	69.0	
	GFDL85	59.9	64.2	69.0	74.4	
	HAD45	59.9	63.1	65.9	68.4	
	HAD85	59.9	62.8	67.3	73.7	
Coldest Month Average	CCSM45	13.6	15.3	17.8	17.9	
	CCSM85	13.6	16.7	18.1	20.5	
	GFDL45	13.6	16.8	19.4	20.5	
	GFDL85	13.6	17.9	20.1	23.2	
	HAD45	13.6	16.2	19.6	19.8	
	HAD85	13.6	17.5	20.2	24.1	
Warmest Month Average	CCSM45	65.8	68.1	69.4	69.5	
	CCSM85	65.8	68.7	70.4	72.6	
	GFDL45	65.8	69.0	71.2	72.5	
	GFDL85	65.8	70.2	73.0	75.9	
	HAD45	65.8	69.3	70.8	72.4	
	HAD85	65.8	69.2	71.9	76.5	

**Precipitation (in)**

	Scenario	2009	2039	2069	2099	
Annual Total	CCSM45	46.6	45.6	44.5	48.7	
	CCSM85	46.6	47.3	47.6	48.5	
	GFDL45	46.6	51.0	52.7	51.6	
	GFDL85	46.6	48.7	51.6	53.3	
	HAD45	46.6	49.1	50.9	50.6	
	HAD85	46.6	50.4	49.6	53.9	
Growing Season May—Sep	CCSM45	21.5	21.1	19.6	21.5	
	CCSM85	21.5	21.4	21.3	19.9	
	GFDL45	21.5	22.3	21.3	21.1	
	GFDL85	21.5	21.6	21.1	19.8	
	HAD45	21.5	22.4	21.2	22.1	
	HAD85	21.5	21.9	20.6	22.1	

**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-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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Section M211D

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
American beech	Fagus grandifolia	WDH	High	93.5	1702.0	16.0	Sm. dec.	Sm. dec.	Medium	Abundant	Fair	Fair			0	1
sugar maple	Acer saccharum	WDH	High	89.2	1578.1	14.5	Sm. dec.	Sm. dec.	High	Abundant	Good	Good			1	2
red maple	Acer rubrum	WDH	High	94.8	1501.2	12.6	Sm. inc.	No change	High	Abundant	Very Good	Very Good			1	3
yellow birch	Betula alleghaniensis	NDL	High	90.4	925.0	9.2	Sm. dec.	Sm. dec.	Medium	Abundant	Fair	Fair			0	4
red spruce	Picea rubens	NDH	High	80.6	859.0	9.9	Sm. dec.	Lg. dec.	Low	Abundant	Fair	Poor			0	5
balsam fir	Abies balsamea	NDH	High	71.3	754.0	9.5	Lg. dec.	Lg. dec.	Low	Abundant	Poor	Poor			0	6
eastern hemlock	Tsuga canadensis	NSH	High	54.9	661.3	9.0	Sm. inc.	No change	Low	Abundant	Good	Fair			1	7
eastern white pine	Pinus strobus	WDH	High	42.5	597.6	9.2	Sm. inc.	Sm. inc.	Low	Abundant	Good	Good			1	8
black cherry	Prunus serotina	WDL	Medium	55.9	329.7	4.2	Sm. inc.	Sm. inc.	Low	Common	Fair	Fair			1	9
paper birch	Betula papyrifera	WDH	High	47.5	280.0	5.2	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	10
white ash	Fraxinus americana	WDL	Medium	48.5	253.7	3.5	Sm. inc.	Lg. inc.	Low	Common	Fair	Good			1	11
northern red oak	Quercus rubra	WDH	Medium	19.8	183.5	5.7	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	12
quaking aspen	Populus tremuloides	WDH	High	26.5	162.9	3.7	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	13
northern white-cedar	Thuja occidentalis	WSH	High	19.6	142.9	5.3	Sm. dec.	No change	Medium	Common	Poor	Fair			1	14
striped maple	Acer pensylvanicum	NSL	Medium	62	133.7	2.0	Sm. dec.	Sm. dec.	Medium	Common	Poor	Poor			0	15
American elm	Ulmus americana	WDH	Medium	15.6	133.1	3.3	Sm. dec.	No change	Medium	Common	Poor	Fair			1	16
red pine	Pinus resinosa	NSH	Medium	8.7	86.8	7.5	No change	No change	Low	Common	Poor	Poor	Infill +	Infill +	0	17
bigtooth aspen	Populus grandidentata	NSL	Medium	19.5	80.6	2.4	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	18
tamarack (native)	Larix laricina	NSH	High	12.3	78.5	5.4	Lg. dec.	Lg. dec.	Low	Common	Very Poor	Very Poor			0	19
eastern hophornbeam; ironw	Ostrya virginiana	WSL	Low	32.4	71.6	1.5	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good			1	20
American basswood	Tilia americana	WSL	Medium	23.7	69.1	1.7	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	21
Scots pine	Pinus sylvestris	NSH	FIA	3.3	49.5	5.6	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	22
gray birch	Betula populifolia	NSL	Low	10.6	46.5	1.6	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	23
black spruce	Picea mariana	NSH	High	6.2	44.7	7.3	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	24
boxelder	Acer negundo	WSH	Low	0.9	42.0	19.3	Lg. dec.	Sm. dec.	High	Rare	Poor	Poor	Infill +	Infill +	2	25
Norway spruce	Picea abies	NSH	FIA	4	40.4	8.5	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	26
black ash	Fraxinus nigra	WSH	Medium	9.2	39.2	2.3	No change	No change	Low	Rare	Very Poor	Very Poor			0	27
sweet birch	Betula lenta	NDH	High	7.7	35.5	3.2	Lg. inc.	Lg. inc.	Low	Rare	Fair	Fair	Infill +	Infill +	2	28
bitternut hickory	Carya cordiformis	WSL	Low	2.9	29.0	3.0	No change	No change	High	Rare	Fair	Fair	Infill +	Infill +	2	29
bur oak	Quercus macrocarpa	NDH	Medium	0.1	23.3	5.2	Lg. dec.	Lg. dec.	High	Rare	Poor	Poor			0	30
serviceberry	Amelanchier spp.	NSL	Low	12.1	21.1	1.0	Sm. inc.	Sm. inc.	Medium	Rare	Fair	Fair			1	31
pin cherry	Prunus pensylvanica	NSL	Low	10	19.0	1.0	Sm. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	32
black locust	Robinia pseudoacacia	NDH	Low	1.5	15.4	5.4	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	2	33
chestnut oak	Quercus prinus	NDH	High	1.5	11.5	2.7	Lg. inc.	Lg. inc.	High	Rare	Good	Good			2	34
slippery elm	Ulmus rubra	WSL	Low	0.5	11.5	2.7	Sm. dec.	No change	Medium	Rare	Very Poor	Poor			2	35
shagbark hickory	Carya ovata	WSL	Medium	2.5	11.1	1.7	Sm. inc.	Lg. inc.	Medium	Rare	Fair	Good	Infill +	Infill ++	2	36
eastern cottonwood	Populus deltoides	NSH	Low	0.5	10.2	6.9	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	37
pitch pine	Pinus rigida	NSH	High	0.4	8.4	1.7	Sm. inc.	Lg. inc.	Medium	Rare	Fair	Good	Infill +	Infill ++	2	38
green ash	Fraxinus pennsylvanica	WSH	Low	0.9	7.6	1.6	Sm. inc.	Lg. inc.	Medium	Rare	Fair	Good	Infill +	Infill ++	2	39
white spruce	Picea glauca	NSL	Medium	1.8	6.0	2.5	Sm. inc.	Sm. inc.	Medium	Rare	Fair	Fair	Infill +	Infill +	2	40
eastern redcedar	Juniperus virginiana	WDH	Medium	0.7	5.9	2.4	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	41
black oak	Quercus velutina	WDH	High	0.4	5.7	0.7	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	42
mountain maple	Acer spicatum	NSL	Low	8.3	5.6	0.7	Lg. dec.	Lg. dec.	High	Rare	Poor	Poor			1	43
butternut	Juglans cinerea	NSLX	FIA	1.3	5.5	1.1	Unknown	Unknown	Low	Rare	FIA Only	FIA Only			0	44
white oak	Quercus alba	WDH	Medium	2.7	5.2	0.9	Lg. inc.	Lg. inc.	High	Rare	Good	Good			2	45
pignut hickory	Carya glabra	WDL	Medium	1.7	5.1	2.1	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	46
jack pine	Pinus banksiana	NSH	Medium	0.4	4.4	10.8	No change	No change	High	Rare	Fair	Fair	Infill +	Infill +	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	
American mountain-ash	Sorbus americana	NSL	Low	2.9	3.6	1.3	Sm. dec.	Sm. dec.	Low	Rare	Very Poor	Very Poor				0	48
American hornbeam; musclev	Carpinus caroliniana	WSL	Low	2.5	3.3	0.6	No change	Lg. inc.	Medium	Rare	Poor	Good		Infill ++		2	49
swamp white oak	Quercus bicolor	NSL	Low	0.2	2.5	3.4	Sm. inc.	Lg. inc.	Medium	Rare	Fair	Good	Infill +			2	50
balsam poplar	Populus balsamifera	NSH	Medium	1.7	2.2	1.4	Very Lg. dec.	Very Lg. dec.	Medium	Rare	Lost	Lost				0	51
chokecherry	Prunus virginiana	NSLX	FIA	1	2.2	0.4	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only				0	52
sassafras	Sassafras albidum	WSL	Low	0.1	1.7	0.9	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good				2	53
black willow	Salix nigra	NSH	Low	0	1.6	0.3	Sm. dec.	No change	Low	Rare	Very Poor	Very Poor				2	54
silver maple	Acer saccharinum	NSH	Low	0.4	0.5	1.0	Lg. inc.	Lg. inc.	High	Rare	Good	Good				2	55
flowering dogwood	Cornus florida	WDL	Medium	0.1	0.3	0.2	No change	Lg. inc.	Medium	Rare	Poor	Good				2	56
shortleaf pine	Pinus echinata	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat				3	57
Table Mountain pine	Pinus pungens	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat				3	58
Virginia pine	Pinus virginiana	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +		3	59
pawpaw	Asimina triloba	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat				3	60
cittamwood/gum bumelia	Sideroxylon lanuginosum ssp.	NSL	Low	0	0	0	Unknown	New Habitat	High	Absent	Unknown	New Habitat				0	61
pecan	Carya illinoensis	NSH	Low	0	0	0	Unknown	New Habitat	Low	Absent	Unknown	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
hackberry	Celtis occidentalis	WDH	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Likely +	Likely +		3	66
eastern redbud	Cercis canadensis	NSL	Low	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		Migrate +		3	68
black walnut	Juglans nigra	WDH	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Likely +	Likely +		3	69
sweetgum	Liquidambar styraciflua	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate ++		3	70
yellow-poplar	Liriodendron tulipifera	WDH	High	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate ++	Migrate ++		3	71
southern magnolia	Magnolia grandiflora	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown				0	72
bigleaf magnolia	Magnolia macrophylla	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown				0	73
mountain or Fraser magnolia	Magnolia fraseri	NSL	Low	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat				0	74
blackgum	Nyssa sylvatica	WDL	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +	Migrate +		3	75
sourwood	Oxydendrum arboreum	NDL	High	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat				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	Likely +	Likely +		3	78
northern pin oak	Quercus ellipsoidalis	NSH	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat				3	79
southern red oak	Quercus falcata	WDL	Medium	0	0	0	Unknown	New Habitat	High	Absent	Unknown	New Habitat		Migrate +		3	80
blackjack oak	Quercus marilandica	NSL	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat				3	81
chinkapin oak	Quercus muehlenbergii	NSL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat				3	82
water oak	Quercus nigra	WDH	High	0	0	0	Unknown	New Habitat	Medium	Absent	Unknown	New Habitat				0	83
pin oak	Quercus palustris	NSH	Low	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat	Migrate +	Migrate +		3	84
Shumard oak	Quercus shumardii	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat				0	85
post oak	Quercus stellata	WDH	High	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat		Migrate ++		3	86
winged elm	Ulmus alata	WDL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat				0	87

