

sq. km sq. mi FIA Plots
Area of Region 83,457 32,223 2,252

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	26	Increase	23	29	Very Good	7	8	Likely	2	1
Ash	4			Medium	35	No Change	19	12	Good	21	24	Infill	11	10
Hickory	5			Low	42	Decrease	41	42	Fair	14	11	Migrate	2	5
Maple	7	Abundant	5	FIA	13	New	16	16	Poor	9	8			
Oak	14	Common	30			Unknown	17	17	Very Poor	31	31			
Pine	8	Rare	61						FIA Only	6	6			
Other	58	Absent	20						Unknown	4	4			
	96		116		116		116	116					15	16

Potential Changes in Climate Variables

Temperature (°F)

	Scenario	2009	2039	2069	2099
Annual Average	CCSM45	51.6	53.5	56.0	56.1
	CCSM85	51.6	54.0	56.5	59.7
	GFDL45	51.6	54.5	57.4	58.4
	GFDL85	51.6	55.0	58.6	62.7
	HAD45	51.6	54.4	57.9	59.4
	HAD85	51.6	54.7	59.2	63.9
Growing Season May—Sep	CCSM45	67.5	69.4	71.6	72.2
	CCSM85	67.5	69.9	72.5	76.5
	GFDL45	67.5	70.8	74.6	76.0
	GFDL85	67.5	71.7	76.0	80.7
	HAD45	67.5	70.9	74.1	76.1
	HAD85	67.5	70.9	76.7	81.7
Coldest Month Average	CCSM45	27.1	28.8	30.4	30.8
	CCSM85	27.1	29.8	30.9	32.6
	GFDL45	27.1	30.5	31.2	32.0
	GFDL85	27.1	30.1	31.2	32.5
	HAD45	27.1	28.0	30.5	30.7
	HAD85	27.1	28.9	30.9	33.2
Warmest Month Average	CCSM45	73.0	75.0	76.3	76.7
	CCSM85	73.0	75.6	77.2	79.4
	GFDL45	73.0	76.3	78.6	79.7
	GFDL85	73.0	77.6	80.2	82.9
	HAD45	73.0	76.9	79.3	80.7
	HAD85	73.0	78.0	82.0	85.2

Precipitation (in)

	Scenario	2009	2039	2069	2099
Annual Total	CCSM45	42.2	44.8	45.3	46.6
	CCSM85	42.2	45.0	46.6	49.6
	GFDL45	42.2	46.4	47.8	49.5
	GFDL85	42.2	43.7	48.7	50.4
	HAD45	42.2	43.7	44.1	43.7
	HAD85	42.2	44.1	41.2	44.2
Growing Season May—Sep	CCSM45	19.8	21.0	20.9	21.4
	CCSM85	19.8	20.3	20.5	21.1
	GFDL45	19.8	21.6	21.0	21.6
	GFDL85	19.8	19.7	20.6	20.8
	HAD45	19.8	21.0	18.4	19.3
	HAD85	19.8	20.2	17.1	17.8

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 221E

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	83.4	1311.4	12.6	Sm. dec.	Lg. dec.	High	Abundant	Good	Good			1	1
black cherry	Prunus serotina	WDL	Medium	68.1	989.5	12.5	Sm. dec.	Lg. dec.	Low	Abundant	Fair	Poor			0	2
sugar maple	Acer saccharum	WDH	High	65.2	801.0	10.3	No change	Sm. dec.	High	Abundant	Very Good	Good			1	3
yellow-poplar	Liriodendron tulipifera	WDH	High	59.8	740.4	10.3	Sm. dec.	Lg. dec.	High	Abundant	Good	Good			1	4
white oak	Quercus alba	WDH	Medium	59.2	665.1	9.2	Sm. inc.	No change	High	Abundant	Very Good	Very Good			1	5
white ash	Fraxinus americana	WDL	Medium	63.4	419.4	5.9	No change	No change	Low	Common	Poor	Poor			0	6
northern red oak	Quercus rubra	WDH	Medium	58.6	376.0	5.1	No change	No change	High	Common	Good	Good			1	7
chestnut oak	Quercus prinus	NDH	High	36.5	352.6	7.0	No change	Sm. dec.	High	Common	Good	Fair			1	8
black locust	Robinia pseudoacacia	NDH	Low	40.4	326.9	6.9	Sm. dec.	No change	Medium	Common	Poor	Fair			1	9
black oak	Quercus velutina	WDH	High	51.1	295.6	4.9	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	10
American elm	Ulmus americana	WDH	Medium	46.1	294.5	5.8	No change	Sm. inc.	Medium	Common	Fair	Good			1	11
American beech	Fagus grandifolia	WDH	High	44.8	261.6	4.8	No change	Sm. dec.	Medium	Common	Fair	Poor			1	12
sassafras	Sassafras albidum	WSL	Low	47.7	232.0	4.0	No change	No change	Medium	Common	Fair	Fair			1	13
pignut hickory	Carya glabra	WDL	Medium	42.7	208.4	4.0	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	14
slippery elm	Ulmus rubra	WSL	Low	41.7	173.3	3.6	No change	No change	Medium	Common	Fair	Fair			1	15
black walnut	Juglans nigra	WDL	Low	33.5	173.3	4.6	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	16
mockernut hickory	Carya alba	WDL	Medium	36.8	165.8	3.8	Sm. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	17
shagbark hickory	Carya ovata	WSL	Medium	42.5	163.6	3.4	No change	No change	Medium	Common	Fair	Fair			1	18
Virginia pine	Pinus virginiana	NDH	High	17.6	148.4	7.0	No change	No change	Medium	Common	Fair	Fair			1	19
blackgum	Nyssa sylvatica	WDL	Medium	42.7	147.0	2.8	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good			1	20
bigtooth aspen	Populus grandidentata	NSL	Medium	21	142.2	6.0	Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor			0	21
sycamore	Platanus occidentalis	NSL	Low	22.7	135.0	5.2	Sm. inc.	Lg. inc.	Medium	Common	Good	Very Good			1	22
scarlet oak	Quercus coccinea	WDL	Medium	24.6	134.8	4.3	Sm. inc.	No change	Medium	Common	Good	Fair			1	23
eastern white pine	Pinus strobus	WDH	High	12.4	132.9	8.8	Lg. dec.	Lg. dec.	Low	Common	Very Poor	Very Poor			0	24
sweet birch	Betula lenta	NDH	High	15.6	129.1	5.4	Lg. dec.	Lg. dec.	Low	Common	Very Poor	Very Poor			0	25
eastern hemlock	Tsuga canadensis	NSH	High	7.8	112.9	9.5	Sm. dec.	Lg. dec.	Low	Common	Poor	Very Poor	Infill +		2	26
boxelder	Acer negundo	WSH	Low	15.9	94.0	5.7	No change	Lg. inc.	High	Common	Good	Very Good			1	27
bitternut hickory	Carya cordiformis	WSL	Low	24.8	85.5	3.0	Sm. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	28
ailanthus	Ailanthus altissima	NSL	FIA	14.6	72.5	4.4	Unknown	Unknown	NA	Common	NNIS	NNIS			0	29
sourwood	Oxydendrum arboreum	NDL	High	19	72.4	2.6	No change	Sm. dec.	High	Common	Good	Fair			1	30
yellow buckeye	Aesculus flava	NSL	Low	13.4	66.4	4.5	Lg. dec.	Lg. dec.	Low	Common	Very Poor	Very Poor			0	31
silver maple	Acer saccharinum	NSH	Low	4.4	57.5	12.2	Sm. dec.	No change	High	Common	Fair	Good	Infill +	Infill ++	1	32
American basswood	Tilia americana	WSL	Medium	14.1	52.7	3.0	Sm. dec.	Lg. dec.	Medium	Common	Poor	Poor			0	33
green ash	Fraxinus pennsylvanica	WSH	Low	13.6	52.4	2.9	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good	Infill ++	Infill ++	1	34
flowering dogwood	Cornus florida	WDL	Medium	28.6	50.0	1.5	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	35
eastern hophornbeam; ironw	Ostrya virginiana	WDL	Low	20.4	43.9	1.8	No change	Sm. inc.	High	Rare	Fair	Good			1	36
eastern redcedar	Juniperus virginiana	WDH	Medium	4.5	40.0	3.9	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	2	37
American hornbeam; musclev	Carpinus caroliniana	WSL	Low	18.9	39.9	1.8	Sm. dec.	Sm. inc.	Medium	Rare	Very Poor	Fair			1	38
eastern redbud	Cercis canadensis	NSL	Low	17.2	39.4	1.8	Sm. inc.	Lg. inc.	Medium	Rare	Fair	Good			1	39
hackberry	Celtis occidentalis	WDH	Medium	7.8	36.3	3.0	No change	Sm. inc.	High	Rare	Fair	Good	Infill +	Infill ++	1	40
quaking aspen	Populus tremuloides	WDH	High	3.9	36.3	7.0	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	41
Scots pine	Pinus sylvestris	NSH	FIA	3.4	35.2	7.4	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	42
cucumbertree	Magnolia acuminata	NSL	Low	10.2	31.3	2.2	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	43
pitch pine	Pinus rigida	NSH	High	6.1	24.2	3.0	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	44
shingle oak	Quercus imbricaria	NDH	Medium	4.8	23.4	4.2	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			2	45
loblolly pine	Pinus taeda	WDH	High	1.4	20.6	14.3	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	46
yellow birch	Betula alleghaniensis	NDL	High	3.6	18.6	2.5	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			2	47



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pawpaw	Asimina triloba	NSL	Low	7.6	18.2	2.1	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	48
serviceberry	Amelanchier spp.	NSL	Low	10.3	17.7	1.3	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	49
Osage-orange	Maclura pomifera	NDH	Medium	2.7	17.6	5.8	No change	Sm. inc.	High	Rare	Fair	Good	Infill +	Infill ++	2	50
red pine	Pinus resinosa	NSH	Medium	3	17.5	4.8	Lg. dec.	Lg. dec.	Low	Rare	Very Poor	Very Poor			0	51
Norway spruce	Picea abies	NSH	FIA	2.3	17.3	6.0	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	52
post oak	Quercus stellata	WDH	High	3.7	17.3	3.8	Lg. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	Infill ++	2	53
eastern cottonwood	Populus deltoides	NSH	Low	2.1	16.7	6.0	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			2	54
black willow	Salix nigra	NSH	Low	1.9	14.7	7.6	Sm. dec.	No change	Low	Rare	Very Poor	Very Poor			2	55
river birch	Betula nigra	NSL	Low	1.3	13.5	8.4	Lg. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			2	56
black maple	Acer nigrum	NSH	Low	3	12.9	4.0	Lg. dec.	Lg. dec.	High	Rare	Poor	Poor			0	57
pin cherry	Prunus pensylvanica	NSL	Low	2	12.6	3.8	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	58
sweetgum	Liquidambar styraciflua	WDH	High	2.1	12.2	4.1	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	59
chinkapin oak	Quercus muehlenbergii	NSL	Medium	2.6	12.0	2.2	Sm. inc.	Sm. inc.	Medium	Rare	Fair	Fair	Infill +	Infill +	2	60
honeylocust	Gleditsia triacanthos	NSH	Low	2.8	10.8	2.5	No change	Lg. inc.	High	Rare	Fair	Good	Infill +	Infill ++	2	61
common persimmon	Diospyros virginiana	NSL	Low	5.1	10.1	1.8	Sm. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	Infill ++	1	62
shortleaf pine	Pinus echinata	WDH	High	2.2	8.1	2.1	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	63
Ohio buckeye	Aesculus glabra	NSL	Low	3	7.7	2.1	Sm. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			2	64
pin oak	Quercus palustris	NSH	Low	1.1	7.0	4.0	No change	No change	Low	Rare	Very Poor	Very Poor			2	65
shellbark hickory	Carya laciniosa	NSL	Low	1.6	6.7	2.0	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	66
butternut	Juglans cinerea	NSLX	FIA	1.6	5.8	2.9	Unknown	Unknown	Low	Rare	FIA Only	FIA Only			0	67
Siberian elm	Ulmus pumila	NDH	FIA	0.1	5.2	43.0	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	68
wild plum	Prunus americana	NSLX	FIA	0.3	4.9	13.1	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	69
red mulberry	Morus rubra	NSL	Low	1	4.2	3.5	No change	Sm. inc.	Medium	Rare	Poor	Fair	Infill +	Infill +	2	70
chokecherry	Prunus virginiana	NSLX	FIA	1.3	3.7	2.7	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	71
blue ash	Fraxinus quadrangulata	NSL	Low	0.5	3.6	2.3	Sm. dec.	Sm. dec.	Low	Rare	Very Poor	Very Poor			2	72
paulownia	Paulownia tomentosa	NSL	FIA	1	3.6	1.4	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	73
Norway maple	Acer platanoides	NSL	FIA	0.6	3.3	5.5	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	74
swamp white oak	Quercus bicolor	NSL	Low	0.9	3.1	2.6	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	75
striped maple	Acer pensylvanicum	NSL	Medium	1.8	3.1	1.1	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	76
jack pine	Pinus banksiana	NSH	Medium	0.1	2.4	20.2	Lg. dec.	Lg. dec.	High	Rare	Poor	Poor			0	77
southern red oak	Quercus falcata	WDL	Medium	0.8	2.3	1.7	Lg. inc.	Lg. inc.	High	Rare	Good	Good			2	78
white spruce	Picea glauca	NSL	Medium	0.4	1.4	3.9	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	79
white mulberry	Morus alba	NSL	FIA	0.6	1.3	2.2	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	80
black ash	Fraxinus nigra	WSH	Medium	0.5	1.2	1.1	Lg. dec.	Lg. dec.	Low	Rare	Very Poor	Very Poor			0	81
northern catalpa	Catalpa speciosa	NSHX	FIA	0.2	0.7	3.1	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	82
mountain or Fraser magnolia	Magnolia fraseri	NSL	Low	0.3	0.7	0.9	Sm. dec.	Sm. dec.	Low	Rare	Very Poor	Very Poor			0	83
balsam poplar	Populus balsamifera	NSH	Medium	0.1	0.6	5.3	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	84
rock elm	Ulmus thomasii	NSLX	FIA	0.1	0.5	4.4	Unknown	Unknown	Low	Rare	FIA Only	FIA Only			0	85
paper birch	Betula papyrifera	WDH	High	0.2	0.5	1.8	Very Lg. dec.	Very Lg. dec.	Medium	Rare	Lost	Lost			0	86
American holly	Ilex opaca	NSL	Medium	0.3	0.5	0.5	Sm. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	87
gray birch	Betula populifolia	NSL	Low	0.2	0.4	1.2	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	88
Shumard oak	Quercus shumardii	NSL	Low	0.1	0.3	1.7	Lg. inc.	Lg. inc.	High	Rare	Good	Good			2	89
sugarberry	Celtis laevigata	NDH	Medium	0.1	0.2	1.5	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	90
American chestnut	Castanea dentata	NSLX	FIA	0.3	0.2	0.4	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	91
bald cypress	Taxodium distichum	NSH	Medium	0.1	0.1	1.0	Sm. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	92
Atlantic white-cedar	Chamaecyparis thyoides	NSH	Low	0.1	0.1	0.9	No change	Lg. dec.	Low	Rare	Very Poor	Very Poor			0	93
blackjack oak	Quercus marilandica	NSL	Medium	0.1	0.1	0.4	Lg. inc.	Lg. inc.	High	Rare	Good	Good			2	94



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red spruce	<i>Picea rubens</i>	NDH	High	0.1	0.1	0.9	Sm. dec.	Sm. dec.	Low	Rare	Very Poor	Very Poor			0	95
bur oak	<i>Quercus macrocarpa</i>	NDH	Medium	0.1	0.1	0.5	Lg. dec.	Lg. dec.	High	Rare	Poor	Poor			0	96
ash juniper	<i>Juniperus ashei</i>	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			0	97
slash pine	<i>Pinus elliotii</i>	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	98
longleaf pine	<i>Pinus palustris</i>	NSH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +	3	99
northern white-cedar	<i>Thuja occidentalis</i>	WSH	High	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	100
florida maple	<i>Acer barbatum</i>	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	101
mountain maple	<i>Acer spicatum</i>	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			3	102
cittamwood/gum bumelia	<i>Sideroxylon lanuginosum ssp.</i>	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			2	103
pecan	<i>Carya illinoensis</i>	NSH	Low	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat		Migrate ++	3	104
black hickory	<i>Carya texana</i>	NDL	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	105
loblolly-bay	<i>Gordonia lasianthus</i>	NSH	Medium	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	106
southern magnolia	<i>Magnolia grandiflora</i>	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	107
bigleaf magnolia	<i>Magnolia macrophylla</i>	NSL	Low	0	0	0	New Habitat	Unknown	Medium	Absent	New Habitat	Unknown	Likely +		3	108
redbay	<i>Persea borbonia</i>	NSL	Low	0	0	0	Unknown	New Habitat	High	Absent	Unknown	New Habitat			3	109
cherrybark oak; swamp red o.	<i>Quercus pagoda</i>	NSL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	110
water oak	<i>Quercus nigra</i>	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	111
willow oak	<i>Quercus phellos</i>	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +	3	112
live oak	<i>Quercus virginiana</i>	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	113
bluejack oak	<i>Quercus incana</i>	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	114
winged elm	<i>Ulmus alata</i>	WDL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Likely +	Likely +	3	115
cedar elm	<i>Ulmus crassifolia</i>	NDH	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat			0	116

