

Current and Potential Future Habitat, Capability, and Migration

	sq. km	sq. mi	FIA Plots
Area of Region	44,632	17,232	1,723

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	2			High	24	27	Increase	32	42	Very Good	12	12
Hickory	5			Medium	34	64	No Change	29	21	Good	20	27
Maple	8	Abundant	7	Low	46	19	Decrease	20	18	Fair	15	15
Oak	18	Common	26	FIA	10		New	15	17	Poor	19	14
Pine	6	Rare	58				Unknown	18	16	Very Poor	15	13
Other	52	Absent	23							FIA Only	7	7
	91		114		114	110		114	114	Unknown	8	6
											96	94

Potential Changes in Climate Variables

Temperature (°F)

	Scenario	2009	2039	2069	2099	
Annual Average	CCSM45	53.9	55.7	57.9	58.0	
	CCSM85	53.9	56.1	58.6	61.4	
	GFDL45	53.9	56.6	59.1	59.9	
	GFDL85	53.9	56.9	60.2	63.9	
	HAD45	53.9	56.2	59.3	60.5	
HAD85	53.9	56.5	60.6	64.7		
Growing Season (May—Sep)	CCSM45	67.5	69.4	71.3	71.8	
	CCSM85	67.5	69.6	72.3	76.0	
	GFDL45	67.5	70.7	73.5	74.9	
	GFDL85	67.5	71.2	75.1	79.2	
	HAD45	67.5	70.6	73.5	75.0	
HAD85	67.5	70.6	76.3	80.4		
Coldest Month Average	CCSM45	33.4	35.5	36.5	36.7	
	CCSM85	33.4	36.0	36.9	38.1	
	GFDL45	33.4	36.6	36.8	37.3	
	GFDL85	33.4	35.4	36.4	37.3	
	HAD45	33.4	33.6	35.6	35.9	
HAD85	33.4	34.5	35.9	37.5		
Warmest Month Average	CCSM45	72.2	74.4	75.4	75.5	
	CCSM85	72.2	74.5	76.2	77.9	
	GFDL45	72.2	75.6	77.0	78.0	
	GFDL85	72.2	76.4	78.6	80.9	
	HAD45	72.2	76.0	78.0	78.7	
HAD85	72.2	76.7	80.4	82.7		

Precipitation (in)

	Scenario	2009	2039	2069	2099	
Annual Total	CCSM45	54.0	57.4	60.8	60.8	
	CCSM85	54.0	58.7	60.7	66.6	
	GFDL45	54.0	60.2	62.5	66.0	
	GFDL85	54.0	58.4	63.9	64.7	
	HAD45	54.0	54.4	57.7	58.4	
HAD85	54.0	59.0	54.4	57.5		
Growing Season (May—Sep)	CCSM45	23.5	26.0	27.7	27.9	
	CCSM85	23.5	26.2	26.2	28.9	
	GFDL45	23.5	27.2	28.3	29.5	
	GFDL85	23.5	25.6	29.0	29.4	
	HAD45	23.5	23.9	23.9	24.4	
HAD85	23.5	26.2	22.2	23.5		

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 M221D

EcoMap 2007
Climate Change Atlas Tree Species

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Northern Research Station
Landscape Change Research Group
Iverson, Peters, Prasad, Matthews

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Common Name	Scientific Name	Range	MR	%Cell	FIAsum	FIAiv	ChngCl45	ChngCl85	Adap	Abund	Capabil45	Capabil85	SHIFT45	SHIFT85	SSO	N
chestnut oak	Quercus prinus	NDH	High	82.7	1402.5	11.4	No change	No change	High	Abundant	Very Good	Very Good			1	1
yellow-poplar	Liriodendron tulipifera	WDH	High	89	1355.8	10.5	Sm. dec.	Sm. dec.	High	Abundant	Good	Good			1	2
red maple	Acer rubrum	WDH	High	95	1228.6	9.1	No change	Sm. dec.	High	Abundant	Very Good	Good			1	3
eastern white pine	Pinus strobus	WDH	High	65.3	811.4	9.4	No change	No change	Low	Abundant	Fair	Fair			0	4
Virginia pine	Pinus virginiana	NDH	High	46.2	519.3	5.9	Sm. inc.	Sm. inc.	Medium	Abundant	Very Good	Very Good			1	5
northern red oak	Quercus rubra	WDH	Medium	79.8	507.6	4.8	Sm. inc.	Sm. inc.	High	Abundant	Very Good	Very Good			1	6
sourwood	Oxydendrum arboreum	NDL	High	68.9	506.1	5.3	No change	Sm. dec.	High	Abundant	Very Good	Good			1	7
scarlet oak	Quercus coccinea	WDL	Medium	69.8	498.7	5.2	No change	No change	Medium	Common	Fair	Fair			1	8
white oak	Quercus alba	WDH	Medium	70.3	492.6	4.5	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good			1	9
sweet birch	Betula lenta	NDH	High	71.8	413.6	4.8	Sm. dec.	Sm. dec.	Low	Common	Poor	Poor			0	10
black locust	Robinia pseudoacacia	NDH	Low	74.4	362.2	3.6	No change	No change	Medium	Common	Fair	Fair			1	11
eastern hemlock	Tsuga canadensis	NSH	High	57.7	330.4	4.7	No change	No change	Low	Common	Poor	Poor			0	12
blackgum	Nyssa sylvatica	WDL	Medium	76.2	305.5	2.7	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good			1	13
black oak	Quercus velutina	WDH	High	60.3	261.9	2.8	Sm. inc.	Lg. inc.	Medium	Common	Good	Very Good			1	14
pignut hickory	Carya glabra	WDL	Medium	63.4	253.1	2.8	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	15
black cherry	Prunus serotina	WDL	Medium	48.6	199.4	2.3	Sm. inc.	Sm. inc.	Low	Common	Fair	Fair			1	16
mockernut hickory	Carya alba	WDL	Medium	47.6	183.3	2.4	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	17
white ash	Fraxinus americana	WDL	Medium	33.6	144.6	3.0	No change	Sm. inc.	Low	Common	Poor	Fair			1	18
pitch pine	Pinus rigida	NSH	High	32.9	144.3	3.3	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	19
shortleaf pine	Pinus echinata	WDH	High	31.3	134.7	2.9	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	20
American beech	Fagus grandifolia	WDH	High	30.1	112.4	2.8	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	21
loblolly pine	Pinus taeda	WDH	High	9.3	110.0	5.5	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good	Infill ++	Infill ++	1	22
sugar maple	Acer saccharum	WDH	High	25.5	105.3	3.3	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good			1	23
flowering dogwood	Cornus florida	WDL	Medium	52.2	100.3	1.3	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	24
southern red oak	Quercus falcata	WDL	Medium	20.7	91.6	2.8	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	25
sassafras	Sassafras albidum	WSL	Low	40	88.0	1.5	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	26
black walnut	Juglans nigra	WDH	Low	15.1	81.9	2.3	No change	Sm. inc.	Medium	Common	Fair	Good			1	27
ailanthus	Ailanthus altissima	NSL	FIA	11.8	77.3	2.8	Unknown	Unknown	NA	Common	NNIS	NNIS			0	28
yellow birch	Betula alleghaniensis	NDL	High	17.1	76.4	4.2	No change	No change	Medium	Common	Fair	Fair			1	29
mountain or Fraser magnolia	Magnolia fraseri	NSL	Low	29	74.9	2.3	No change	No change	Low	Common	Poor	Poor			0	30
eastern redcedar	Juniperus virginiana	WDH	Medium	7.3	66.1	2.3	Sm. inc.	Lg. inc.	Medium	Common	Good	Very Good			1	31
American basswood	Tilia americana	WSL	Medium	20.1	59.6	2.6	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	32
red spruce	Picea rubens	NDH	High	3.8	56.1	14.7	Sm. dec.	Sm. dec.	Low	Common	Poor	Poor	Infill +	Infill +	2	33
cucumbertree	Magnolia acuminata	NSL	Low	21	48.5	1.9	No change	No change	Medium	Rare	Poor	Poor			1	34
serviceberry	Amelanchier spp.	NSL	Low	36.6	47.6	1.1	No change	No change	Medium	Rare	Poor	Poor			1	35
yellow buckeye	Aesculus flava	NSL	Low	13.5	43.0	2.9	No change	No change	Low	Rare	Very Poor	Very Poor			0	36
striped maple	Acer pensylvanicum	NSL	Medium	22.6	35.9	1.4	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	37
post oak	Quercus stellata	WDH	High	11.3	35.7	1.6	Lg. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	Infill ++	1	38
shagbark hickory	Carya ovata	WSL	Medium	10.5	35.2	1.9	Sm. inc.	Sm. inc.	Medium	Rare	Fair	Fair	Infill +	Infill +	1	39
green ash	Fraxinus pennsylvanica	WSH	Low	11.6	32.9	1.6	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			1	40
sweetgum	Liquidambar styraciflua	WDH	High	6.8	30.7	1.4	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	1	41
bitternut hickory	Carya cordiformis	WSL	Low	13.7	30.7	1.5	Sm. inc.	Lg. inc.	High	Rare	Good	Good			1	42
Table Mountain pine	Pinus pungens	NSL	Low	7.9	30.6	2.6	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor			1	43
silverbell	Halesia spp.	NSL	Low	11.3	30.1	2.6	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	1	44
sycamore	Platanus occidentalis	NSL	Low	4	28.7	2.8	No change	Sm. inc.	Medium	Rare	Poor	Fair	Infill +	Infill +	2	45
American hornbeam; muscle	Carpinus caroliniana	WSL	Low	11.7	26.1	1.4	Sm. inc.	Lg. inc.	Medium	Rare	Fair	Good			1	46
common persimmon	Diospyros virginiana	NSL	Low	6.6	24.3	1.2	No change	No change	High	Rare	Fair	Fair			1	47



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American holly	Ilex opaca	NSL	Medium	13.5	23.1	1.2	Sm. dec.	Sm. inc.	Medium	Rare	Very Poor	Fair			1	48
eastern redbud	Cercis canadensis	NSL	Low	8.4	20.5	0.8	No change	No change	Medium	Rare	Poor	Poor			1	49
boxelder	Acer negundo	WSH	Low	3.4	20.0	2.2	Sm. dec.	No change	High	Rare	Poor	Fair	Infill +	Infill +	2	50
American elm	Ulmus americana	WDH	Medium	8	18.5	1.1	No change	Sm. inc.	Medium	Rare	Poor	Fair	Infill +	Infill +	1	51
eastern hophornbeam; ironw	Ostrya virginiana	WSL	Low	9.7	18.1	1.2	No change	Sm. inc.	High	Rare	Fair	Good	Infill +	Infill ++	1	52
pin cherry	Prunus pensylvanica	NSL	Low	4.9	17.3	3.1	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	53
paulownia	Paulownia tomentosa	NSL	FIA	2.6	12.3	1.5	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	54
hackberry	Celtis occidentalis	WDH	Medium	3.3	9.3	0.8	No change	No change	High	Rare	Fair	Fair	Infill +	Infill +	2	55
American chestnut	Castanea dentata	NSLX	FIA	11.1	9.0	0.7	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	56
slippery elm	Ulmus rubra	WSL	Low	4.5	7.9	0.8	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	57
black willow	Salix nigra	NSH	Low	1	7.1	4.0	Sm. dec.	Sm. inc.	Low	Rare	Very Poor	Poor		Infill +	2	58
chinkapin oak	Quercus muehlenbergii	NSL	Medium	1.2	6.5	1.9	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	59
silver maple	Acer saccharinum	NSH	Low	0.6	5.9	3.5	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor		Infill +	2	60
red mulberry	Morus rubra	NSL	Low	3.8	5.7	0.9	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	1	61
winged elm	Ulmus alata	WDL	Medium	2.1	5.7	1.2	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	2	62
pin oak	Quercus palustris	NSH	Low	0.2	5.6	1.2	Sm. dec.	Sm. dec.	Low	Rare	Very Poor	Very Poor			2	63
swamp chestnut oak	Quercus michauxii	NSL	Low	0.1	4.4	2.2	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			2	64
chokecherry	Prunus virginiana	NSLX	FIA	0.5	4.3	6.0	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	65
pawpaw	Asimina triloba	NSL	Low	2.1	3.1	0.5	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	66
blackjack oak	Quercus marilandica	NSL	Medium	1.8	2.4	0.8	Lg. inc.	Lg. inc.	High	Rare	Good	Good			2	67
river birch	Betula nigra	NSL	Low	0.8	2.3	2.4	No change	Lg. inc.	Medium	Rare	Poor	Good	Infill +	Infill ++	2	68
white mulberry	Morus alba	NSL	FIA	0.6	2.3	0.8	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	69
sand hickory	Carya pallida	NSL	FIA	0.7	2.1	1.7	Unknown	Unknown	NA	Rare	FIA Only	FIA Only			0	70
bear oak; scrub oak	Quercus ilicifolia	NSLX	FIA	0.3	1.9	2.9	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	71
shingle oak	Quercus imbricaria	NDH	Medium	0.3	1.9	1.4	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	72
butternut	Juglans cinerea	NSLX	FIA	1.2	1.7	1.1	Unknown	Unknown	Low	Rare	FIA Only	FIA Only			0	73
water oak	Quercus nigra	WDH	High	0.4	1.5	0.8	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	74
bigleaf magnolia	Magnolia macrophylla	NSL	Low	1.1	1.1	0.7	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	75
honeylocust	Gleditsia triacanthos	NSH	Low	0.7	1.1	1.6	No change	Lg. inc.	High	Rare	Fair	Good			2	76
mountain maple	Acer spicatum	NSL	Low	1.1	0.8	0.7	No change	No change	High	Rare	Fair	Fair			0	77
cherrybark oak; swamp red o.	Quercus pagoda	NSL	Medium	0.1	0.5	1.6	No change	Lg. inc.	Medium	Rare	Poor	Good	Infill +		2	78
American mountain-ash	Sorbus americana	NSL	Low	0.7	0.5	0.8	Sm. dec.	Sm. dec.	Low	Rare	Very Poor	Very Poor			0	79
eastern cottonwood	Populus deltoides	NSH	Low	0.2	0.5	2.2	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	80
bigtooth aspen	Populus grandidentata	NSL	Medium	0.2	0.4	1.9	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	81
florida maple	Acer barbatum	NSL	Low	0.3	0.4	0.7	Lg. inc.	Lg. inc.	High	Rare	Good	Good			2	82
southern magnolia	Magnolia grandiflora	NSL	Low	0.5	0.4	0.4	Sm. inc.	Lg. inc.	Medium	Rare	Fair	Good			2	83
sugarberry	Celtis laevigata	NDH	Medium	0	0.2	0.1	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	84
Shumard oak	Quercus shumardii	NSL	Low	0.7	0.2	0.3	Lg. inc.	Lg. inc.	High	Rare	Good	Good			2	85
black maple	Acer nigrum	NSH	Low	0.4	0.2	0.4	No change	No change	High	Rare	Fair	Fair			0	86
willow oak	Quercus phellos	NSL	Low	0.1	0.2	0.1	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	87
gray birch	Betula populifolia	NSL	Low	0.2	0.1	0.5	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	88
wild plum	Prunus americana	NSLX	FIA	0.2	0.1	0.5	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	89
rock elm	Ulmus thomasii	NSLX	FIA	0	0.1	0.0	Unknown	Unknown	Low	Rare	FIA Only	FIA Only			0	90
overcup oak	Quercus lyrata	NSL	Medium	0.2	0.0	0.1	Sm. dec.	No change	Low	Rare	Very Poor	Very Poor			2	91
ashe juniper	Juniperus ashei	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			0	92
slash pine	Pinus elliottii	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate ++	3	93
spruce pine	Pinus glabra	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	94



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longleaf pine	<i>Pinus palustris</i>	NSH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate ++	Migrate ++	3	95
pond cypress	<i>Taxodium ascendens</i>	NSH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate ++		3	96
northern white-cedar	<i>Thuja occidentalis</i>	WSH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	97
Ohio buckeye	<i>Aesculus glabra</i>	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	98
cittamwood/gum bumelia	<i>Sideroxylon lanuginosum ssp.</i>	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			3	99
water hickory	<i>Carya aquatica</i>	NSL	Medium	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	100
pecan	<i>Carya illinoensis</i>	NSH	Low	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat		Migrate +	3	101
shellbark hickory	<i>Carya laciniosa</i>	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	102
black hickory	<i>Carya texana</i>	NDL	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	103
black ash	<i>Fraxinus nigra</i>	WSH	Medium	0	0	0	Unknown	New Habitat	Low	Absent	Unknown	New Habitat			3	104
blue ash	<i>Fraxinus quadrangulata</i>	NSL	Low	0	0	0	Unknown	Unknown	Low	Absent	Unknown	Unknown			0	105
Osage-orange	<i>Maclura pomifera</i>	NDH	Medium	0	0	0	Unknown	New Habitat	High	Absent	Unknown	New Habitat		Likely +	3	106
sweetbay	<i>Magnolia virginiana</i>	NSL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	107
swamp tupelo	<i>Nyssa biflora</i>	NDH	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat	Likely +	Likely +	3	108
redbay	<i>Persea borbonia</i>	NSL	Low	0	0	0	Unknown	Unknown	High	Absent	Unknown	Unknown			0	109
swamp white oak	<i>Quercus bicolor</i>	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	110
laurel oak	<i>Quercus laurifolia</i>	NDH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate ++	Migrate +	3	111
live oak	<i>Quercus virginiana</i>	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate ++	3	112
bluejack oak	<i>Quercus incana</i>	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +	3	113
cedar elm	<i>Ulmus crassifolia</i>	NDH	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat			2	114