

	sq. km	sq. mi	FIA Plots
Area of Region	31,889	12,312	671

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	Low	RCP45	RCP85	RCP45	RCP85	RCP45	RCP85
Ash	4			20	29	Increase	23	22	Very Good	10	7
Hickory	5			30	51	No Change	13	14	Good	15	19
Maple	5	Abundant	3	39	14	Decrease	33	33	Fair	10	9
Oak	15	Common	31	10		New	14	15	Poor	18	20
Pine	6	Rare	45			Unknown	16	15	Very Poor	14	12
Other	44	Absent	20	99	94		99	99	FIA Only	5	5
	79		99						Unknown	6	5
										78	77

Potential Changes in Climate Variables

Temperature (°F)

	Scenario	2009	2039	2069	2099	
Annual Average	CCSM45	54.6	56.4	58.7	59.0	
	CCSM85	54.6	56.9	59.5	62.7	
	GFDL45	54.6	58.3	60.1	60.9	
	GFDL85	54.6	57.7	61.1	65.0	
	HAD45	54.6	57.3	60.8	62.2	
	HAD85	54.6	57.8	62.4	66.7	
Growing Season (May—Sep)	CCSM45	70.7	72.4	74.5	75.1	
	CCSM85	70.7	73.0	75.7	79.7	
	GFDL45	70.7	75.1	77.2	78.6	
	GFDL85	70.7	74.4	78.7	83.1	
	HAD45	70.7	73.9	77.3	79.1	
	HAD85	70.7	74.4	80.7	85.0	
Coldest Month Average	CCSM45	29.5	30.9	32.5	33.0	
	CCSM85	29.5	32.3	33.2	35.0	
	GFDL45	29.5	33.5	33.8	34.3	
	GFDL85	29.5	32.0	33.1	33.8	
	HAD45	29.5	30.5	33.0	33.2	
	HAD85	29.5	31.8	33.9	35.8	
Warmest Month Average	CCSM45	76.1	77.7	79.0	79.5	
	CCSM85	76.1	78.5	80.3	82.2	
	GFDL45	76.1	79.5	81.4	82.3	
	GFDL85	76.1	80.1	82.8	85.3	
	HAD45	76.1	80.0	82.8	83.9	
	HAD85	76.1	81.8	86.3	88.7	

Precipitation (in)

	Scenario	2009	2039	2069	2099	
Annual Total	CCSM45	45.2	46.3	50.2	49.0	
	CCSM85	45.2	48.3	49.5	52.9	
	GFDL45	45.2	50.7	52.8	55.9	
	GFDL85	45.2	48.5	53.9	57.0	
	HAD45	45.2	47.0	48.9	48.1	
	HAD85	45.2	46.6	44.3	48.2	
Growing Season (May—Sep)	CCSM45	20.2	19.9	21.4	20.7	
	CCSM85	20.2	20.1	19.6	20.5	
	GFDL45	20.2	22.8	21.8	22.8	
	GFDL85	20.2	21.2	21.8	22.4	
	HAD45	20.2	20.6	18.8	19.1	
	HAD85	20.2	19.9	16.2	16.8	

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 223F

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
eastern redcedar	Juniperus virginiana	WDH	Medium	64.4	965.0	15.9	No change	No change	Medium	Abundant	Good	Good			1	1
sugar maple	Acer saccharum	WDH	High	67.3	633.5	9.1	No change	Sm. dec.	High	Abundant	Very Good	Good			1	2
white ash	Fraxinus americana	WDL	Medium	66.8	606.4	9.1	Sm. dec.	Sm. dec.	Low	Abundant	Fair	Fair			0	3
black walnut	Juglans nigra	WDH	Low	65.1	393.3	6.6	Sm. dec.	No change	Medium	Common	Poor	Fair			1	4
black locust	Robinia pseudoacacia	NDH	Low	54.9	383.1	8.0	Sm. dec.	No change	Medium	Common	Poor	Fair			1	5
hackberry	Celtis occidentalis	WDH	Medium	57.8	322.5	6.3	No change	No change	High	Common	Good	Good			1	6
red maple	Acer rubrum	WDH	High	30.8	298.8	7.9	Sm. dec.	Sm. dec.	High	Common	Fair	Fair			1	7
American elm	Ulmus americana	WDH	Medium	64.4	287.4	4.6	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	8
white oak	Quercus alba	WDH	Medium	31.5	273.8	6.3	Sm. inc.	No change	High	Common	Very Good	Good			1	9
yellow-poplar	Liriodendron tulipifera	WDH	High	35.7	273.3	7.0	Sm. dec.	Lg. dec.	High	Common	Fair	Fair			1	10
chinkapin oak	Quercus muehlenbergii	NSL	Medium	47.7	257.3	6.0	Sm. dec.	Sm. dec.	Medium	Common	Poor	Poor			0	11
green ash	Fraxinus pennsylvanica	WSH	Low	46.3	230.7	6.2	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	12
black cherry	Prunus serotina	WDL	Medium	55.5	197.5	3.9	No change	Sm. dec.	Low	Common	Poor	Poor			0	13
slippery elm	Ulmus rubra	WSL	Low	53.2	191.1	3.7	No change	Sm. inc.	Medium	Common	Fair	Good			1	14
shagbark hickory	Carya ovata	WSL	Medium	41.4	189.9	4.4	No change	No change	Medium	Common	Fair	Fair			1	15
boxelder	Acer negundo	WSH	Low	46.8	169.6	4.3	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good			1	16
bitternut hickory	Carya cordiformis	WSL	Low	46.3	164.9	3.9	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good			1	17
sassafras	Sassafras albidum	WSL	Low	38.5	157.9	4.3	Sm. dec.	Sm. dec.	Medium	Common	Poor	Poor			0	18
sycamore	Platanus occidentalis	NSL	Low	28.5	157.1	5.3	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	19
northern red oak	Quercus rubra	WDH	Medium	42	149.1	4.0	Sm. inc.	No change	High	Common	Very Good	Good			1	20
pignut hickory	Carya glabra	WDL	Medium	32.6	130.6	3.3	No change	Sm. dec.	Medium	Common	Fair	Poor			1	21
Osage-orange	Maclura pomifera	NDH	Medium	23.2	116.1	6.5	Sm. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	22
honeylocust	Gleditsia triacanthos	NSH	Low	31.6	104.0	3.5	Sm. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	23
black oak	Quercus velutina	WDH	High	16.2	96.6	3.6	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	24
eastern redbud	Cercis canadensis	NSL	Low	39.8	93.9	2.3	No change	No change	Medium	Common	Fair	Fair			1	25
sweetgum	Liquidambar styraciflua	WDH	High	15.7	92.9	6.5	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good	Infill ++	Infill ++	1	26
American beech	Fagus grandifolia	WDH	High	22.8	84.3	3.4	Sm. dec.	Sm. dec.	Medium	Common	Poor	Poor	Infill +	Infill +	0	27
Virginia pine	Pinus virginiana	NDH	High	10.8	79.0	6.6	Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor	Infill +	Infill +	0	28
Ohio buckeye	Aesculus glabra	NSL	Low	29.6	75.1	2.8	Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor			0	29
Shumard oak	Quercus shumardii	NSL	Low	15.8	71.6	5.4	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good	Infill ++	Infill ++	1	30
pin oak	Quercus palustris	NSH	Low	11.4	67.2	6.5	Sm. dec.	Sm. dec.	Low	Common	Poor	Poor	Infill +	Infill +	0	31
chestnut oak	Quercus prinus	NDH	High	7.9	61.6	3.5	Sm. dec.	Sm. dec.	High	Common	Fair	Fair	Infill +	Infill +	2	32
shellbark hickory	Carya laciniosa	NSL	Low	14.6	59.4	4.3	Sm. dec.	Sm. dec.	Medium	Common	Poor	Poor	Infill +	Infill +	0	33
scarlet oak	Quercus coccinea	WDL	Medium	14.2	51.4	3.1	Sm. dec.	Lg. dec.	Medium	Common	Poor	Poor			0	34
blackgum	Nyssa sylvatica	WDL	Medium	19.1	47.0	2.2	Sm. inc.	Sm. inc.	High	Rare	Good	Good			1	35
mockernut hickory	Carya alba	WDL	Medium	16.5	45.6	2.6	Lg. inc.	Lg. inc.	High	Rare	Good	Good			1	36
flowering dogwood	Cornus florida	WDL	Medium	23.2	32.9	1.3	Sm. inc.	No change	Medium	Rare	Fair	Poor			1	37
eastern cottonwood	Populus deltoides	NSH	Low	3.5	32.8	5.5	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	38
blue ash	Fraxinus quadrangulata	NSL	Low	12.7	31.1	2.7	Sm. dec.	Sm. dec.	Low	Rare	Very Poor	Very Poor			0	39
silver maple	Acer saccharinum	NSH	Low	6	28.6	4.2	No change	No change	High	Rare	Fair	Fair	Infill +	Infill +	2	40
yellow buckeye	Aesculus flava	NSL	Low	8	24.5	2.8	Lg. dec.	Lg. dec.	Low	Rare	Very Poor	Very Poor			0	41
American basswood	Tilia americana	WSL	Medium	9.6	22.6	2.9	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	42
shingle oak	Quercus imbricaria	NDH	Medium	5.8	19.8	3.2	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	43
post oak	Quercus stellata	WDH	High	1.6	17.1	5.5	Lg. inc.	Lg. inc.	High	Rare	Good	Good			2	44
black maple	Acer nigrum	NSH	Low	1.8	14.7	7.2	Lg. dec.	Lg. dec.	High	Rare	Poor	Poor			0	45
eastern white pine	Pinus strobus	WDH	High	1.6	14.3	5.3	Lg. dec.	Very Lg. dec.	Low	Rare	Very Poor	Lost			0	46
pawpaw	Asimina triloba	NSL	Low	10.1	12.9	1.3	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	47



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eastern hophornbeam; ironw	Ostrya virginiana	WSL	Low	12	11.9	1.1	Lg. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	Infill ++	1	48
ailanthus	Ailanthus altissima	NSL	FIA	8.7	11.0	1.8	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	49
common persimmon	Diospyros virginiana	NSL	Low	6.9	10.6	1.3	Lg. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	Infill ++	1	50
American hornbeam; muscle	Carpinus caroliniana	WSL	Low	13.7	10.3	0.9	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			1	51
red mulberry	Morus rubra	NSL	Low	6	8.7	1.3	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	1	52
sourwood	Oxydendrum arboreum	NDL	High	5.2	8.4	1.3	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor	Infill +	Infill +	2	53
river birch	Betula nigra	NSL	Low	1.4	8.2	3.2	Sm. dec.	No change	Medium	Rare	Very Poor	Poor		Infill +	2	54
black willow	Salix nigra	NSH	Low	1.3	7.3	2.1	No change	Sm. inc.	Low	Rare	Very Poor	Poor		Infill +	2	55
northern catalpa	Catalpa speciosa	NSHX	FIA	2.2	6.7	2.1	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	56
bigtooth aspen	Populus grandidentata	NSL	Medium	4.5	6.3	1.9	Very Lg. dec.	Very Lg. dec.	Medium	Rare	Lost	Lost			0	57
bur oak	Quercus macrocarpa	NDH	Medium	1.9	5.9	2.3	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor		Infill +	2	58
Siberian elm	Ulmus pumila	NDH	FIA	0.7	5.1	4.8	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	59
red pine	Pinus resinosa	NSH	Medium	0.5	4.3	1.8	Lg. dec.	Lg. dec.	Low	Rare	Very Poor	Very Poor			0	60
swamp chestnut oak	Quercus michauxii	NSL	Low	0.3	4.2	13.5	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	61
northern pin oak	Quercus ellipsoidalis	NSH	Medium	0.1	3.2	3.2	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor			0	62
Kentucky coffeetree	Gymnocladus dioicus	NSLX	FIA	3.8	2.7	2.7	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	63
southern red oak	Quercus falcata	WDL	Medium	0.6	2.1	3.4	Lg. inc.	Lg. inc.	High	Rare	Good	Good			2	64
butternut	Juglans cinerea	NSLX	FIA	1.9	1.5	2.0	Unknown	Unknown	Low	Rare	FIA Only	FIA Only			0	65
winged elm	Ulmus alata	WDL	Medium	3.3	1.3	0.6	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	66
rock elm	Ulmus thomasii	NSLX	FIA	1	1.3	0.7	Unknown	Unknown	Low	Rare	FIA Only	FIA Only			0	67
white mulberry	Morus alba	NSL	FIA	0.6	1.0	0.3	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	68
swamp white oak	Quercus bicolor	NSL	Low	0.9	1.0	1.1	Very Lg. dec.	Lg. dec.	Medium	Rare	Lost	Very Poor			0	69
shortleaf pine	Pinus echinata	WDH	High	1.2	0.9	1.0	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	70
cucumbertree	Magnolia acuminata	NSL	Low	1.3	0.8	10.6	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	71
black ash	Fraxinus nigra	WSH	Medium	0.5	0.8	1.0	Lg. dec.	Sm. dec.	Low	Rare	Very Poor	Very Poor			0	72
sugarberry	Celtis laevigata	NDH	Medium	0.6	0.7	1.1	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	73
paulownia	Paulownia tomentosa	NSL	FIA	0.5	0.6	0.3	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	74
serviceberry	Amelanchier spp.	NSL	Low	0.2	0.6	0.3	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	75
wild plum	Prunus americana	NSLX	FIA	0.3	0.5	1.7	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	76
yellow birch	Betula alleghaniensis	NDL	High	0.6	0.4	0.6	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	77
Scots pine	Pinus sylvestris	NSH	FIA	0.3	0.3	1.1	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	78
pitch pine	Pinus rigida	NSH	High	0.3	0.2	0.5	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	79
Atlantic white-cedar	Chamaecyparis thyoides	NSH	Low	0	0	0	Unknown	Unknown	Low	Absent	Unknown	Unknown			0	80
ashe juniper	Juniperus ashei	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			0	81
slash pine	Pinus elliotii	NDH	High	0	0	0	Unknown	New Habitat	Medium	Absent	Unknown	New Habitat			3	82
loblolly pine	Pinus taeda	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate ++	Migrate ++	3	83
florida maple	Acer barbatum	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	84
striped maple	Acer pensylvanicum	NSL	Medium	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	85
mountain maple	Acer spicatum	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			3	86
cittamwood/gum bumelia	Sideroxylon lanuginosum ssp.	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			3	87
pecan	Carya illinoensis	NSH	Low	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat	Migrate +	Migrate ++	3	88
black hickory	Carya texana	NDL	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate ++	3	89
bigleaf magnolia	Magnolia macrophylla	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	90
redbay	Persea borbonia	NSL	Low	0	0	0	Unknown	Unknown	High	Absent	Unknown	Unknown			0	91
pin cherry	Prunus pensylvanica	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	92
cherrybark oak; swamp red o	Quercus pagoda	NSL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	93
blackjack oak	Quercus marilandica	NSL	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +	Migrate ++	3	94



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Common Name	Scientific Name	Range	MR	%Cell	FIAsum	FIAiv	ChngCl45	ChngCl85	Adap	Abund	Capabil45	Capabil85	SHIFT45	SHIFT85	SSO	N
water oak	Quercus nigra	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate ++	3	95
Nuttall oak	Quercus texana	NSH	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			0	96
willow oak	Quercus phellos	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	97
live oak	Quercus virginiana	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	98
cedar elm	Ulmus crassifolia	NDH	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat			2	99