

Current and Potential Future Habitat, Capability, and Migration

	sq. km	sq. mi	FIA Plots
Area of Region	172,689	66,675	1,189

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	4			High	15	24	Increase	16	22	Very Good	3	5	Likely	0	0
Hickory	7			Medium	30	50	No Change	23	17	Good	11	13	Infill	37	34
Maple	5	Abundant	0	Low	35	12	Decrease	21	21	Fair	15	12	Migrate	7	10
Oak	15	Common	15	FIA	10		New	14	15	Poor	14	15			
Pine	3	Rare	55				Unknown	16	15	Very Poor	17	15			
Other	36	Absent	20							FIA Only	6	6			
	70		90		90	86		90	90	Unknown	6	5			
											72	71			

Potential Changes in Climate Variables

Temperature (°F)

	Scenario	2009	2039	2069	2099	
Annual Average	CCSM45	51.4	53.3	55.5	56.0	
	CCSM85	51.4	54.1	56.6	59.5	
	GFDL45	51.4	57.1	56.6	57.7	
	GFDL85	51.4	54.3	57.5	61.8	
	HAD45	51.4	54.0	57.3	59.0	
	HAD85	51.4	54.5	59.2	63.3	
Growing Season (May—Sep)	CCSM45	69.8	72.1	73.9	74.8	
	CCSM85	69.8	73.0	75.4	78.8	
	GFDL45	69.8	77.1	76.0	77.9	
	GFDL85	69.8	73.6	77.2	82.5	
	HAD45	69.8	72.4	75.1	77.1	
	HAD85	69.8	73.0	78.2	82.1	
Coldest Month Average	CCSM45	21.9	23.9	25.8	26.2	
	CCSM85	21.9	24.7	26.0	27.8	
	GFDL45	21.9	25.7	26.4	26.8	
	GFDL85	21.9	24.9	26.4	27.8	
	HAD45	21.9	23.4	26.6	26.7	
	HAD85	21.9	26.0	29.1	31.5	
Warmest Month Average	CCSM45	76.1	78.4	79.8	80.5	
	CCSM85	76.1	80.0	81.6	83.4	
	GFDL45	76.1	79.6	81.2	82.5	
	GFDL85	76.1	80.3	81.8	85.5	
	HAD45	76.1	78.7	80.7	81.6	
	HAD85	76.1	80.4	83.5	85.7	

Precipitation (in)

	Scenario	2009	2039	2069	2099	
Annual Total	CCSM45	37.3	36.2	37.9	36.3	
	CCSM85	37.3	36.4	37.5	37.7	
	GFDL45	37.3	40.7	42.8	42.6	
	GFDL85	37.3	40.8	45.4	44.7	
	HAD45	37.3	40.1	40.9	40.5	
	HAD85	37.3	39.2	38.2	41.1	
Growing Season (May—Sep)	CCSM45	21.5	20.7	21.4	19.9	
	CCSM85	21.5	20.1	20.4	20.0	
	GFDL45	21.5	23.1	23.4	23.2	
	GFDL85	21.5	23.5	24.8	23.5	
	HAD45	21.5	22.1	21.7	21.9	
	HAD85	21.5	21.5	19.5	19.6	

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 251C

EcoMap 2007
Climate Change Atlas Tree Species

USDA Forest Service
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
American elm	Ulmus americana	WDH	Medium	70.3	176.5	10.5	No change	No change	Medium	Common	Fair	Fair	Infill +	Infill +	1	1
white oak	Quercus alba	WDH	Medium	29.6	159.3	14.8	Sm. dec.	Lg. dec.	High	Common	Fair	Fair	Infill +	Infill +	1	2
shagbark hickory	Carya ovata	WSL	Medium	42.2	122.4	9.6	Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor	Infill +	Infill +	0	3
black walnut	Juglans nigra	WDH	Low	51.1	110.9	9.5	No change	No change	Medium	Common	Fair	Fair	Infill +	Infill +	1	4
hackberry	Celtis occidentalis	WDH	Medium	54.2	101.3	9.8	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good	Infill ++	Infill ++	1	5
shingle oak	Quercus imbricaria	NDH	Medium	30.4	87.1	9.5	Sm. dec.	Lg. dec.	Medium	Common	Poor	Poor	Infill +	Infill +	0	6
honeylocust	Gleditsia triacanthos	NSH	Low	37.7	82.8	10.8	No change	Sm. inc.	High	Common	Good	Very Good	Infill ++	Infill ++	1	7
Osage-orange	Maclura pomifera	NDH	Medium	25.9	70.8	13.9	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good	Infill ++	Infill ++	1	8
black oak	Quercus velutina	WDH	High	28.2	70.5	8.0	No change	No change	Medium	Common	Fair	Fair	Infill +	Infill +	1	9
eastern redcedar	Juniperus virginiana	WDH	Medium	25.8	69.8	9.7	Sm. inc.	Lg. inc.	Medium	Common	Good	Very Good	Infill ++	Infill ++	1	10
silver maple	Acer saccharinum	NSH	Low	18.7	68.0	19.6	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good	Infill ++	Infill ++	1	11
northern red oak	Quercus rubra	WDH	Medium	28.4	60.9	7.2	No change	Sm. dec.	High	Common	Good	Fair	Infill ++	Infill +	1	12
white ash	Fraxinus americana	WDL	Medium	28.1	55.3	6.1	No change	Sm. inc.	Low	Common	Poor	Fair	Infill +	Infill +	1	13
bur oak	Quercus macrocarpa	NDH	Medium	25.5	53.5	10.5	No change	No change	High	Common	Good	Good	Infill ++	Infill ++	2	14
black cherry	Prunus serotina	WDL	Medium	41.1	50.9	5.5	No change	Sm. dec.	Low	Common	Poor	Poor	Infill +	Infill +	0	15
bitternut hickory	Carya cordiformis	WSL	Low	34.6	47.1	5.8	Sm. inc.	Sm. inc.	High	Rare	Good	Good	Infill ++	Infill ++	1	16
slippery elm	Ulmus rubra	WSL	Low	40.2	45.0	4.4	No change	Sm. inc.	Medium	Rare	Poor	Fair	Infill +	Infill +	1	17
red mulberry	Morus rubra	NSL	Low	36.4	44.9	6.6	Sm. inc.	No change	Medium	Rare	Fair	Poor	Infill +	Infill +	1	18
green ash	Fraxinus pennsylvanica	WSH	Low	24.7	44.7	7.7	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	1	19
boxelder	Acer negundo	WSH	Low	26.2	41.8	8.7	No change	Sm. inc.	High	Rare	Fair	Good	Infill +	Infill ++	1	20
sugar maple	Acer saccharum	WDH	High	9.5	41.3	8.4	No change	No change	High	Rare	Fair	Fair	Infill +	Infill +	2	21
eastern cottonwood	Populus deltoides	NSH	Low	14.9	32.6	12.8	Sm. inc.	Sm. inc.	Medium	Rare	Fair	Fair	Infill +	Infill +	2	22
pin oak	Quercus palustris	NSH	Low	12.7	32.4	10.3	No change	No change	Low	Rare	Very Poor	Very Poor			2	23
black locust	Robinia pseudoacacia	NDH	Low	10	30.7	12.2	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	1	24
American basswood	Tilia americana	WSL	Medium	15.1	28.8	7.7	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	25
black willow	Salix nigra	NSH	Low	12.5	28.1	11.7	Sm. dec.	Sm. inc.	Low	Rare	Very Poor	Poor		Infill +	2	26
post oak	Quercus stellata	WDH	High	6.1	22.5	7.9	Sm. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	Infill ++	2	27
eastern hophornbeam; ironw	Ostrya virginiana	WSL	Low	21	22.0	4.2	No change	No change	High	Rare	Fair	Fair	Infill +	Infill +	1	28
swamp white oak	Quercus bicolor	NSL	Low	9.3	15.8	6.4	Sm. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			2	29
sycamore	Platanus occidentalis	NSL	Low	6.7	15.5	7.4	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	30
chinkapin oak	Quercus muehlenbergii	NSL	Medium	9.5	14.8	4.6	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	31
mockernut hickory	Carya alba	WDL	Medium	8.8	9.8	3.3	No change	No change	High	Rare	Fair	Fair	Infill +	Infill +	2	32
sassafras	Sassafras albidum	WSL	Low	5.3	9.6	4.1	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	33
eastern redbud	Cercis canadensis	NSL	Low	7.3	7.9	3.1	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	34
Ohio buckeye	Aesculus glabra	NSL	Low	7.3	7.6	4.4	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	35
pignut hickory	Carya glabra	WDL	Medium	3.9	7.6	4.2	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	36
river birch	Betula nigra	NSL	Low	4.8	7.1	5.5	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			2	37
Siberian elm	Ulmus pumila	NDH	FIA	4.9	6.6	7.8	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	38
white mulberry	Morus alba	NSL	FIA	5.6	5.8	4.5	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	39
black maple	Acer nigrum	NSH	Low	2.6	3.3	6.7	Lg. dec.	Lg. dec.	High	Rare	Poor	Poor			0	40
black hickory	Carya texana	NDL	High	2.5	3.3	3.0	Sm. inc.	Lg. inc.	Medium	Rare	Fair	Good	Infill +		2	41
common persimmon	Diospyros virginiana	NSL	Low	1.8	3.0	2.1	Sm. inc.	Lg. inc.	High	Rare	Good	Good			2	42
flowering dogwood	Cornus florida	WDL	Medium	3.7	2.5	1.6	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	43
blue ash	Fraxinus quadrangulata	NSL	Low	0.3	2.3	7.9	Lg. dec.	Lg. dec.	Low	Rare	Very Poor	Very Poor			0	44
Shumard oak	Quercus shumardii	NSL	Low	0.7	2.2	2.7	No change	Sm. inc.	High	Rare	Fair	Good	Infill +		2	45
sugarberry	Celtis laevigata	NDH	Medium	0.3	2.1	7.8	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	46
eastern white pine	Pinus strobus	WDH	High	0.8	2.0	17.3	Lg. dec.	Lg. dec.	Low	Rare	Very Poor	Very Poor			0	47



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northern catalpa	Catalpa speciosa	NSHX	FIA	0.8	1.9	10.2	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	48
northern pin oak	Quercus ellipsoidalis	NSH	Medium	1.7	1.9	5.7	Lg. dec.	Lg. dec.	High	Rare	Poor	Poor			0	49
scarlet oak	Quercus coccinea	WDL	Medium	0.2	1.8	7.1	Sm. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	50
wild plum	Prunus americana	NSLX	FIA	2.6	1.7	5.5	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	51
shellbark hickory	Carya laciniosa	NSL	Low	3.1	1.6	2.8	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			2	52
pecan	Carya illinoensis	NSH	Low	1.7	1.4	5.7	Lg. inc.	Lg. inc.	Low	Rare	Fair	Fair	Infill +	Infill +	2	53
Kentucky coffeetree	Gymnocladus dioicus	NSLX	FIA	3	1.3	3.6	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	54
southern red oak	Quercus falcata	WDL	Medium	0.1	0.9	6.7	No change	Lg. inc.	High	Rare	Fair	Good	Infill +		2	55
pawpaw	Asimina triloba	NSL	Low	2	0.8	1.9	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			2	56
serviceberry	Amelanchier spp.	NSL	Low	1.6	0.7	1.1	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	57
blackjack oak	Quercus marilandica	NSL	Medium	0.7	0.6	2.3	Lg. inc.	Lg. inc.	High	Rare	Good	Good			2	58
red pine	Pinus resinosa	NSH	Medium	0.6	0.5	5.9	Lg. dec.	Lg. dec.	Low	Rare	Very Poor	Very Poor			0	59
black ash	Fraxinus nigra	WSH	Medium	0.5	0.5	5.5	Lg. dec.	Lg. dec.	Low	Rare	Very Poor	Very Poor			0	60
Scots pine	Pinus sylvestris	NSH	FIA	0.3	0.3	3.8	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	61
cherrybark oak; swamp red o.	Quercus pagoda	NSL	Medium	0.1	0.3	4.9	Sm. inc.	Lg. inc.	Medium	Rare	Fair	Good	Infill +		2	62
American hornbeam; muscle	Carpinus caroliniana	WSL	Low	0.4	0.3	1.3	Lg. dec.	No change	Medium	Rare	Very Poor	Poor			0	63
butternut	Juglans cinerea	NSLX	FIA	0.4	0.2	1.6	Unknown	Unknown	Low	Rare	FIA Only	FIA Only			0	64
bigtooth aspen	Populus grandidentata	NSL	Medium	0.3	0.2	6.3	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	65
ailanthus	Ailanthus altissima	NSL	FIA	0.2	0.2	1.7	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	66
red maple	Acer rubrum	WDH	High	0.2	0.2	0.6	Lg. inc.	Lg. inc.	High	Rare	Good	Good			2	67
peachleaf willow	Salix amygdaloides	NSLX	FIA	0.5	0.2	5.2	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	68
chokecherry	Prunus virginiana	NSLX	FIA	0.5	0.1	4.5	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	69
quaking aspen	Populus tremuloides	WDH	High	0.2	0.0	0.8	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	70
ashe juniper	Juniperus ashei	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			0	71
loblolly pine	Pinus taeda	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate ++	3	72
striped maple	Acer pensylvanicum	NSL	Medium	0	0	0	Unknown	New Habitat	Medium	Absent	Unknown	New Habitat			3	73
mountain maple	Acer spicatum	NSL	Low	0	0	0	Unknown	Unknown	High	Absent	Unknown	Unknown			0	74
yellow birch	Betula alleghaniensis	NDL	High	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	75
cittamwood/gum bumelia	Sideroxylon lanuginosum ssp.	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	76
American beech	Fagus grandifolia	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	77
silverbell	Halesia spp.	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	78
sweetgum	Liquidambar styraciflua	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate ++	3	79
yellow-poplar	Liriodendron tulipifera	WDH	High	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	80
bigleaf magnolia	Magnolia macrophylla	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	81
blackgum	Nyssa sylvatica	WDL	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +	Migrate ++	3	82
pin cherry	Prunus pennsylvanica	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	83
overcup oak	Quercus lyrata	NSL	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat		Migrate +	3	84
water oak	Quercus nigra	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate ++	3	85
willow oak	Quercus phellos	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	86
live oak	Quercus virginiana	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			0	87
bluejack oak	Quercus incana	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	88
winged elm	Ulmus alata	WDL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate ++	3	89
cedar elm	Ulmus crassifolia	NDH	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat			3	90

