

sq. km    sq. mi    FIA Plots  
Area of Region    87,401    33,746    128

**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	9	13	Increase	4	6	Very Good	0	0	Likely	1	1
Hickory	1			Medium	16	32	No Change	8	8	Good	2	2	Infill	12	14
Maple	2	Abundant	0	Low	21	5	Decrease	9	7	Fair	5	8	Migrate	3	6
Oak	4	Common	1	FIA	6		New	12	12	Poor	9	7			
Pine	0	Rare	26				Unknown	19	19	Very Poor	5	4			
Other	18	Absent	20							FIA Only	4	4			
	<b>27</b>		<b>47</b>		<b>52</b>	<b>50</b>		<b>52</b>	<b>52</b>	Unknown	13	13		<b>16</b>	<b>21</b>
											<b>38</b>	<b>38</b>			

**Potential Changes in Climate Variables**

**Temperature (°F)**

	Scenario	2009	2039	2069	2099	
Annual Average	CCSM45	53.8	55.6	57.5	58.2	
	CCSM85	53.8	56.1	58.3	61.2	
	GFDL45	53.8	59.9	58.6	59.9	
	GFDL85	53.8	56.6	59.6	63.9	
	HAD45	53.8	56.4	59.5	60.4	
	HAD85	53.8	56.8	61.7	64.6	
Growing Season (May—Sep)	CCSM45	72.0	74.2	76.4	77.1	
	CCSM85	72.0	74.8	77.1	80.6	
	GFDL45	72.0	80.3	78.1	80.3	
	GFDL85	72.0	75.7	79.2	84.6	
	HAD45	72.0	74.2	76.7	77.6	
	HAD85	72.0	74.8	79.8	82.4	
Coldest Month (Average)	CCSM45	26.9	28.8	29.8	30.8	
	CCSM85	26.9	29.3	29.9	31.6	
	GFDL45	26.9	30.3	30.6	30.9	
	GFDL85	26.9	28.7	30.1	31.1	
	HAD45	26.9	29.0	31.5	31.3	
	HAD85	26.9	31.2	34.0	35.6	
Warmest Month (Average)	CCSM45	79.2	81.6	83.3	83.9	
	CCSM85	79.2	82.8	84.2	86.4	
	GFDL45	79.2	83.1	84.3	85.9	
	GFDL85	79.2	83.6	84.9	89.0	
	HAD45	79.2	81.3	82.9	83.4	
	HAD85	79.2	83.0	85.3	86.8	

**Precipitation (in)**

	Scenario	2009	2039	2069	2099	
Annual Total	CCSM45	26.8	27.3	27.0	26.4	
	CCSM85	26.8	27.5	27.6	28.4	
	GFDL45	26.8	29.3	31.5	30.3	
	GFDL85	26.8	30.0	33.5	31.3	
	HAD45	26.8	29.7	28.9	30.2	
	HAD85	26.8	28.1	27.0	29.8	
Growing Season (May—Sep)	CCSM45	17.1	16.4	15.9	15.6	
	CCSM85	17.1	16.6	16.1	16.6	
	GFDL45	17.1	18.7	19.8	18.6	
	GFDL85	17.1	19.1	21.2	19.5	
	HAD45	17.1	18.1	18.7	18.7	
	HAD85	17.1	17.1	15.9	16.4	

**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 332E

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
green ash	Fraxinus pennsylvanica	WSH	Low	26.5	52.3	24.2	Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor	Infill +	Infill +	2	1
hackberry	Celtis occidentalis	WDH	Medium	22.4	45.9	19.5	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor	Infill +	Infill +	2	2
red mulberry	Morus rubra	NSL	Low	20.4	39.9	20.0	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			2	3
American elm	Ulmus americana	WDH	Medium	26.1	36.1	16.4	No change	Sm. inc.	Medium	Rare	Poor	Fair	Infill +	Infill +	2	4
eastern cottonwood	Populus deltoides	NSH	Low	12.1	24.2	22.8	Sm. inc.	Sm. inc.	Medium	Rare	Fair	Fair	Infill +	Infill +	2	5
honeylocust	Gleditsia triacanthos	NSH	Low	10.2	18.7	26.2	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor	Infill +	Infill +	2	6
Osage-orange	Maclura pomifera	NDH	Medium	7.5	17.5	16.5	No change	No change	High	Rare	Fair	Fair	Infill +	Infill +	2	7
eastern redcedar	Juniperus virginiana	WDH	Medium	12.9	14.9	10.8	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	8
Siberian elm	Ulmus pumila	NDH	FIA	4.7	11.1	25.5	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	9
bur oak	Quercus macrocarpa	NDH	Medium	4.3	10.0	24.6	No change	No change	High	Rare	Fair	Fair	Infill +	Infill +	2	10
black walnut	Juglans nigra	WDH	Low	5.9	6.4	11.9	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	11
boxelder	Acer negundo	WSH	Low	7.4	4.7	9.1	No change	No change	High	Rare	Fair	Fair	Infill +	Infill +	2	12
black locust	Robinia pseudoacacia	NDH	Low	0.7	3.9	10.0	No change	Sm. inc.	Medium	Rare	Poor	Fair	Infill +	Infill +	2	13
black willow	Salix nigra	NSH	Low	2.9	2.8	13.2	No change	No change	Low	Rare	Very Poor	Very Poor			2	14
northern catalpa	Catalpa speciosa	NSHX	FIA	1.1	2.7	7.1	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	15
slippery elm	Ulmus rubra	WSL	Low	4.4	2.2	5.5	Sm. dec.	No change	Medium	Rare	Very Poor	Poor		Infill +	2	16
peachleaf willow	Salix amygdaloides	NSLX	FIA	1.6	1.6	6.8	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	17
white ash	Fraxinus americana	WDL	Medium	1.5	1.5	17.6	Sm. dec.	Sm. dec.	Low	Rare	Very Poor	Very Poor			2	18
silver maple	Acer saccharinum	NSH	Low	0.5	0.8	26.1	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor	Infill +	Infill +	2	19
pecan	Carya illinoensis	NSH	Low	0.1	0.5	5.5	Lg. inc.	Lg. inc.	Low	Rare	Fair	Fair	Infill +	Infill +	2	20
wild plum	Prunus americana	NSLX	FIA	0.7	0.4	2.8	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	21
white mulberry	Morus alba	NSL	FIA	0	0.2	0.2	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	22
Kentucky coffeetree	Gymnocladus dioicus	NSLX	FIA	0.5	0.2	7.1	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	23
eastern redbud	Cercis canadensis	NSL	Low	0	0.1	0.2	No change	No change	Medium	Rare	Poor	Poor		Infill +	2	24
northern red oak	Quercus rubra	WDH	Medium	0.1	0.0	0.4	Sm. dec.	No change	High	Rare	Poor	Fair			0	25
blackjack oak	Quercus marilandica	NSL	Medium	0.1	0.0	0.2	Lg. inc.	Lg. inc.	High	Rare	Good	Good			2	26
chinkapin oak	Quercus muehlenbergii	NSL	Medium	0.1	0.0	0.2	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	27
ashe juniper	Juniperus ashei	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			0	28
shortleaf pine	Pinus echinata	WDH	High	0	0	0	Unknown	Unknown	Medium	Modeled	Unknown	Unknown			0	29
striped maple	Acer pensylvanicum	NSL	Medium	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	30
sugar maple	Acer saccharum	WDH	High	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			3	31
Ohio buckeye	Aesculus glabra	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	32
serviceberry	Amelanchier spp.	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	33
pawpaw	Asimina triloba	NSL	Low	0	0	0	Unknown	Unknown	Medium	Modeled	Unknown	Unknown			0	34
yellow birch	Betula alleghaniensis	NDL	High	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	35
cittamwood/gum bumelia	Sideroxylon lanuginosum ssp.	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	36
American hornbeam; muscle	Carpinus caroliniana	WSL	Low	0	0	0	Unknown	Unknown	Medium	Modeled	Unknown	Unknown			0	37
black hickory	Carya texana	NDL	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	38
sugarberry	Celtis laevigata	NDH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate ++	Migrate ++	3	39
black ash	Fraxinus nigra	WSH	Medium	0	0	0	Unknown	Unknown	Low	Absent	Unknown	Unknown			0	40
southern magnolia	Magnolia grandiflora	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	41
bigleaf magnolia	Magnolia macrophylla	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	42
eastern hophornbeam; ironw	Ostrya virginiana	WSL	Low	0	0	0	Unknown	Unknown	High	Modeled	Unknown	Unknown			0	43
pin cherry	Prunus pensylvanica	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	44
southern red oak	Quercus falcata	WDL	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat		Migrate +	3	45
cherrybark oak; swamp red o	Quercus pagoda	NSL	Medium	0	0	0	Unknown	Unknown	Medium	Modeled	Unknown	Unknown			0	46
water oak	Quercus nigra	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +	3	47



# Section 332E

## EcoMap 2007

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Common Name	Scientific Name	Range	MR	%Cell	FIAsum	FIAiv	ChngCl45	ChngCl85	Adap	Abund	Capabil45	Capabil85	SHIFT45	SHIFT85	SSO	N
post oak	Quercus stellata	WDH	High	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Likely +	Likely +	3	48
black oak	Quercus velutina	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	49
live oak	Quercus virginiana	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	50
winged elm	Ulmus alata	WDL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate ++	3	51
cedar elm	Ulmus crassifolia	NDH	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat			3	52