

# Section 251F

## EcoMap 2007

### Climate Change Atlas Tree Species

#### Current and Potential Future Habitat, Capability, and Migration

USDA Forest Service  
Northern Research Station  
Landscape Change Research Group  
Iverson, Peters, Prasad, Matthews

	sq. km	sq. mi	FIA Plots
Area of Region	24,559	9,482.1	84

### 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	15	Increase	4	8	Very Good	0	0
Hickory	3			Medium	15	27	No Change	16	14	Good	5	6
Maple	2	Abundant	0	Low	24	8	Decrease	17	15	Fair	10	11
Oak	7	Common	6	FIA	4		New	6	6	Poor	7	9
Pine	2	Rare	35				Unknown	9	9	Very Poor	14	11
Other	25	Absent	11							FIA Only	2	2
	<b>41</b>		<b>52</b>		<b>52</b>	<b>50</b>		<b>52</b>	<b>52</b>	Unknown	5	5
											<b>43</b>	<b>44</b>

### Potential Changes in Climate Variables

#### Temperature (°F)

	Scenario	2009	2039	2069	2099	
Annual Average	CCSM45	55.9	57.8	59.7	60.2	
	CCSM85	55.9	58.3	60.6	63.2	
	GFDL45	55.9	62.1	60.9	62.2	
	GFDL85	55.9	58.8	61.8	65.9	
	HAD45	55.9	58.4	61.3	62.3	
HAD85	55.9	58.7	63.5	66.6		
Growing Season (May-Sep)	CCSM45	73.5	75.8	77.6	78.3	
	CCSM85	73.5	76.5	78.6	81.8	
	GFDL45	73.5	81.8	79.7	81.9	
	GFDL85	73.5	77.3	80.7	86.0	
	HAD45	73.5	75.6	77.9	78.9	
HAD85	73.5	76.3	81.4	84.0		
Coldest Month Average	CCSM45	29.0	31.0	32.2	32.9	
	CCSM85	29.0	31.4	32.2	33.9	
	GFDL45	29.0	32.9	33.2	33.3	
	GFDL85	29.0	30.9	32.3	33.2	
	HAD45	29.0	30.6	33.2	33.1	
HAD85	29.0	32.6	35.1	36.9		
Warmest Month Average	CCSM45	80.3	82.8	84.0	84.6	
	CCSM85	80.3	83.8	85.0	86.8	
	GFDL45	80.3	84.6	85.8	87.4	
	GFDL85	80.3	84.8	86.2	90.4	
	HAD45	80.3	82.3	84.0	84.5	
HAD85	80.3	84.2	86.7	88.1		

#### Precipitation (in)

	Scenario	2009	2039	2069	2099	
Annual Total	CCSM45	35.3	34.3	35.6	34.2	
	CCSM85	35.3	35.5	35.5	36.7	
	GFDL45	35.3	38.1	40.6	38.7	
	GFDL85	35.3	38.8	44.5	41.8	
	HAD45	35.3	38.4	37.7	38.6	
HAD85	35.3	36.8	34.0	37.9		
Growing Season (May-Sep)	CCSM45	21.2	19.5	20.2	19.3	
	CCSM85	21.2	20.6	20.0	20.8	
	GFDL45	21.2	23.2	23.7	22.8	
	GFDL85	21.2	23.8	27.0	24.6	
	HAD45	21.2	22.2	22.8	22.6	
HAD85	21.2	21.3	18.9	20.0		

**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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Common Name	Scientific Name	Range	MR	%Cell	FIAsum	FIAiv	ChngCl45	ChngCl85	Adap	Abund	Capabil45	Capabil85	SHIFT45	SHIFT85	SSO	N
hackberry	Celtis occidentalis	WDH	Medium	47.2	140.5	15.3	Sm. dec.	Sm. dec.	High	Common	Fair	Fair	Infill +	Infill +	1	1
American elm	Ulmus americana	WDH	Medium	53.8	99.1	11.4	No change	No change	Medium	Common	Fair	Fair	Infill +	Infill +	1	2
Osage-orange	Maclura pomifera	NDH	Medium	23.8	87.1	29.5	No change	No change	High	Common	Good	Good	Infill ++	Infill ++	2	3
bur oak	Quercus macrocarpa	NDH	Medium	28.5	77.1	12.6	Lg. dec.	Lg. dec.	High	Common	Fair	Fair	Infill +	Infill +	2	4
eastern redcedar	Juniperus virginiana	WDH	Medium	31.7	72.8	11.9	No change	No change	Medium	Common	Fair	Fair	Infill +	Infill +	2	5
green ash	Fraxinus pennsylvanica	WSH	Low	31	58.6	8.5	Sm. dec.	Sm. dec.	Medium	Common	Poor	Poor	Infill +	Infill +	2	6
red mulberry	Morus rubra	NSL	Low	24.4	36.1	8.7	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			2	7
post oak	Quercus stellata	WDH	High	8.5	34.0	13.1	No change	No change	High	Rare	Fair	Fair	Infill +	Infill +	2	8
black walnut	Juglans nigra	WDH	Low	30.1	33.4	9.3	No change	Sm. inc.	Medium	Rare	Poor	Fair	Infill +	Infill +	2	9
chinkapin oak	Quercus muehlenbergii	NSL	Medium	11.8	21.6	9.5	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			2	10
honeylocust	Gleditsia triacanthos	NSH	Low	21.4	18.4	7.0	Sm. inc.	Sm. inc.	High	Rare	Good	Good	Infill ++	Infill ++	2	11
pecan	Carya illinoensis	NSH	Low	8.1	17.2	12.3	No change	Sm. inc.	Low	Rare	Very Poor	Poor		Infill +	2	12
eastern redbud	Cercis canadensis	NSL	Low	16.2	14.8	5.9	Lg. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			2	13
blackjack oak	Quercus marilandica	NSL	Medium	8.9	14.3	5.8	No change	No change	High	Rare	Fair	Fair	Infill +	Infill +	2	14
eastern cottonwood	Populus deltoides	NSH	Low	8.6	13.1	8.8	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	15
bitternut hickory	Carya cordiformis	WSL	Low	12.2	12.8	6.5	Lg. dec.	Lg. dec.	High	Rare	Poor	Poor	Infill +	Infill +	2	16
Siberian elm	Ulmus pumila	NDH	FIA	2.5	12.4	14.9	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	17
black willow	Salix nigra	NSH	Low	7.5	11.4	5.7	No change	No change	Low	Rare	Very Poor	Very Poor			2	18
slippery elm	Ulmus rubra	WSL	Low	13.8	10.7	4.9	Sm. dec.	No change	Medium	Rare	Very Poor	Poor		Infill +	2	19
white ash	Fraxinus americana	WDL	Medium	2.7	7.6	5.8	No change	No change	Low	Rare	Very Poor	Very Poor			2	20
black oak	Quercus velutina	WDH	High	3.3	7.0	5.2	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			2	21
common persimmon	Diospyros virginiana	NSL	Low	5.1	5.8	5.7	No change	No change	High	Rare	Fair	Fair	Infill +	Infill +	2	22
Kentucky coffeetree	Gymnocladus dioicus	NSLX	FIA	11.6	5.7	1.8	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			2	23
sycamore	Platanus occidentalis	NSL	Low	6	4.7	4.8	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	24
boxelder	Acer negundo	WSH	Low	7	4.3	3.4	No change	Sm. inc.	High	Rare	Fair	Good	Infill +		2	25
black hickory	Carya texana	NDL	High	5.9	3.6	1.6	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	26
sugarberry	Celtis laevigata	NDH	Medium	3.8	3.2	3.4	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	27
northern red oak	Quercus rubra	WDH	Medium	3	2.6	1.2	No change	No change	High	Rare	Fair	Fair	Infill +	Infill +	2	28
wild plum	Prunus americana	NSLX	FIA	5	2.6	4.5	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	29
white mulberry	Morus alba	NSL	FIA	1.1	2.3	1.7	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	30
Shumard oak	Quercus shumardii	NSL	Low	1.8	1.9	1.6	No change	No change	High	Rare	Fair	Fair	Infill +	Infill +	2	31
American basswood	Tilia americana	WSL	Medium	4.7	1.2	3.3	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	32
cittamwood/gum bumelia	Sideroxylon lanuginosum ssp.	NSL	Low	2.6	1.2	0.5	Lg. inc.	Lg. inc.	High	Rare	Good	Good			2	33
eastern white pine	Pinus strobus	WDH	High	1.7	1.0	9.4	Sm. dec.	Sm. dec.	Low	Rare	Very Poor	Very Poor			0	34
silver maple	Acer saccharinum	NSH	Low	1.2	0.6	1.1	Very Lg. dec.	Lg. dec.	High	Rare	Lost	Poor			0	35
eastern hophornbeam; ironw	Ostrya virginiana	WSL	Low	1.3	0.6	4.5	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor			0	36
river birch	Betula nigra	NSL	Low	0.3	0.3	0.5	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	37
shortleaf pine	Pinus echinata	WDH	High	1.7	0.3	2.9	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	38
winged elm	Ulmus alata	WDL	Medium	0.9	0.1	0.2	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	39
Ohio buckeye	Aesculus glabra	NSL	Low	1.7	0.0	0.4	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	40
black cherry	Prunus serotina	WDL	Medium	0.3	0.0	0.1	Lg. dec.	Lg. inc.	Low	Rare	Very Poor	Fair			0	41
Atlantic white-cedar	Chamaecyparis thyoides	NSH	Low	0	0	0	Unknown	Unknown	Low	Absent	Unknown	Unknown			0	42
ashe juniper	Juniperus ashei	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			0	43
sugar maple	Acer saccharum	WDH	High	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat		Migrate +	3	44
serviceberry	Amelanchier spp.	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	45
black ash	Fraxinus nigra	WSH	Medium	0	0	0	Unknown	Unknown	Low	Absent	Unknown	Unknown			0	46
bigleaf magnolia	Magnolia macrophylla	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	47



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Common Name	Scientific Name	Range	MR	%Cell	FIAsum	FIaiv	ChngCl45	ChngCl85	Adap	Abund	Capabil45	Capabil85	SHIFT45	SHIFT85	SSO	N
pin cherry	<i>Prunus pensylvanica</i>	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	48
water oak	<i>Quercus nigra</i>	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +	3	49
live oak	<i>Quercus virginiana</i>	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate ++	Migrate ++	3	50
black locust	<i>Robinia pseudoacacia</i>	NDH	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate ++	3	51
cedar elm	<i>Ulmus crassifolia</i>	NDH	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat	Migrate ++	Migrate ++	3	52