

**One x One Degree**  
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	9,273.2	3,580.4	15

**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	Reliability		Adaptability	Potential Change in Habitat Suitability		Capability to Cope or Persist		Migration Potential			
		High	Low		Scenario RCP45	Scenario RCP85		Scenario RCP45	Scenario RCP85	SHIFT RCP45	SHIFT RCP85				
Ash	1			High	1	8	Increase	5	6	Very Good	0	0	Likely	0	0
Hickory	0			Medium	8	13	No Change	4	4	Good	3	4	Infill	6	7
Maple	2	Abundant	0	Low	13	3	Decrease	4	3	Fair	5	4	Migrate	1	3
Oak	1	Common	3	FIA	4		New	8	8	Poor	4	4		7	10
Pine	0	Rare	14				Unknown	5	5	Very Poor	1	1			
Other	13	Absent	9					26	26	FIA Only	2	2			
	17		26		26	24				Unknown	1	1			
											16	16			

**Potential Changes in Climate Variables**

Temperature (°F)						
	Scenario	2009	2039	2069	2099	
Annual	CCSM45	49.7	51.6	53.6	54.5	
Average	CCSM85	49.7	52.1	54.5	57.6	
	GFDL45	49.7	55.8	54.4	55.8	
	GFDL85	49.7	52.4	55.6	59.9	
	HAD45	49.7	52.4	56.0	56.9	
	HAD85	49.7	53.1	57.9	61.5	
Growing Season	CCSM45	68.7	70.9	73.2	74.0	
	CCSM85	68.7	71.6	74.0	77.8	
May—Sep	GFDL45	68.7	76.8	74.7	76.8	
	GFDL85	68.7	72.3	76.0	81.4	
	HAD45	68.7	70.9	73.8	74.7	
	HAD85	68.7	71.7	76.4	79.6	
Coldest Month	CCSM45	20.6	23.1	24.2	25.2	
	CCSM85	20.6	23.2	24.4	26.3	
Average	GFDL45	20.6	23.8	24.3	24.6	
	GFDL85	20.6	23.1	24.6	26.1	
	HAD45	20.6	23.1	26.5	26.0	
	HAD85	20.6	26.4	30.0	32.3	
Warmest Month	CCSM45	75.3	77.6	79.5	80.2	
	CCSM85	75.3	79.2	80.7	83.2	
Average	GFDL45	75.3	78.9	80.2	81.6	
	GFDL85	75.3	79.7	81.2	84.9	
	HAD45	75.3	77.3	79.3	79.8	
	HAD85	75.3	78.9	81.5	83.6	

Precipitation (in)						
	Scenario	2009	2039	2069	2099	
Annual	CCSM45	28.2	29.4	28.6	28.2	
Total	CCSM85	28.2	28.9	29.3	29.5	
	GFDL45	28.2	32.0	34.7	33.4	
	GFDL85	28.2	32.3	35.3	33.9	
	HAD45	28.2	32.3	31.0	32.0	
	HAD85	28.2	30.0	30.3	32.7	
Growing Season	CCSM45	18.0	18.0	16.8	16.8	
Season	CCSM85	18.0	17.0	16.8	16.8	
May—Sep	GFDL45	18.0	20.8	22.2	20.3	
	GFDL85	18.0	20.8	22.2	20.4	
	HAD45	18.0	19.7	18.9	19.4	
	HAD85	18.0	18.6	17.6	17.1	

**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
red mulberry	Morus rubra	NSL	Low	31.6	73.3	13.8	Sm. dec.	Sm. dec.	Medium	Common	Poor	Poor	Infill +	Infill +	2	1
eastern redcedar	Juniperus virginiana	WDH	Medium	19.7	56.1	30.5	No change	Sm. inc.	Medium	Common	Fair	Good	Infill +		2	2
eastern cottonwood	Populus deltoides	NSH	Low	15.5	52.1	15.9	No change	No change	Medium	Common	Fair	Fair	Infill +	Infill +	2	3
American elm	Ulmus americana	WDH	Medium	18.7	39.0	7.0	Sm. inc.	Sm. inc.	Medium	Rare	Fair	Fair	Infill +	Infill +	2	4
green ash	Fraxinus pennsylvanica	WSH	Low	25.5	38.0	15.8	Sm. inc.	No change	Medium	Rare	Fair	Poor	Infill +	Infill +	2	5
hackberry	Celtis occidentalis	WDH	Medium	24.5	34.1	8.6	Sm. inc.	Sm. inc.	High	Rare	Good	Good			2	6
peachleaf willow	Salix amygdaloides	NSLX	FIA	5.2	29.0	11.0	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	7
Siberian elm	Ulmus pumila	NDH	FIA	2.2	26.9	4.7	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	8
white mulberry	Morus alba	NSL	FIA	0.3	21.1	5.2	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	9
boxelder	Acer negundo	WSH	Low	12.3	16.8	5.9	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor		Infill +	2	10
black willow	Salix nigra	NSH	Low	7.1	11.0	17.4	Sm. dec.	No change	Low	Rare	Very Poor	Very Poor			2	11
honeylocust	Gleditsia triacanthos	NSH	Low	4.6	5.2	4.4	No change	No change	High	Rare	Fair	Fair	Infill +	Infill +	2	12
silver maple	Acer saccharinum	NSH	Low	4.6	4.4	5.7	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor			0	13
bur oak	Quercus macrocarpa	NDH	Medium	3.6	4.1	12.6	Lg. inc.	Lg. inc.	High	Rare	Good	Good			2	14
black walnut	Juglans nigra	WDH	Low	2.1	3.8	7.1	No change	Sm. inc.	Medium	Rare	Poor	Fair		Infill +	2	15
northern catalpa	Catalpa speciosa	NSHX	FIA	3.6	1.1	3.4	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	16
slippery elm	Ulmus rubra	WSL	Low	3.6	0.3	1.0	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	17
bitternut hickory	Carya cordiformis	WSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			3	18
pecan	Carya illinoensis	NSH	Low	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat			3	19
shagbark hickory	Carya ovata	WSL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	20
sugarberry	Celtis laevigata	NDH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	21
eastern redbud	Cercis canadensis	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	22
white ash	Fraxinus americana	WDL	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat			3	23
Osage-orange	Maclura pomifera	NDH	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	24
post oak	Quercus stellata	WDH	High	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat		Migrate ++	3	25
black locust	Robinia pseudoacacia	NDH	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate ++	3	26