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# 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 10,748 4,149.7 81

### **Species Information**

The columns below provide breif 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						Potentia	al Change	in Habitat Suitability	Capability	to Cope o	r Persist	Migratio	n Potent	tial
Ash	2				Model			Scenario	Scenario		Scenario	Scenario		SHIFT	SHIFT
Hickory	3	Abu	ndance		Reliability	Adaptability		RCP45	RCP85		RCP45	RCP85		RCP45	RCP85
Maple	1	Abundant	0	High	9	14	Increase	5	5	Very Good	0	0	Likely	0	0
Oak	7	Common	6	Medium	19	24	No Change	6	7	Good	4	4	Infill	7	9
Pine	1	Rare	31	Low	13	5	Decrease	24	23	Fair	4	5	Migrate	1	0
Other	23	Absent	5	FIA	2		New	1	1	Poor	15	14	•	8	9
-	37	_	42		43	43	Unknown	7	7	Very Poor	11	11			
							-	43	43	FIA Only	2	2			
										Unknown	5	5			
Potentia	ıl Change	es in Climate Var	iahles								41	//1			

## Potential Changes in Climate Variables

Temperatu	ıre (°F)				
	Scenario	2009	2039	2069	2099
Annual	CCSM45	69.1	70.7	71.9	72.3
Average	CCSM85	69.1	70.9	73.1	75.2
	GFDL45	69.1	74.3	73.2	74.6
	GFDL85	69.1	71.6	74.7	78.0
	HAD45	69.1	71.1	73.5	74.5
	HAD85	69.1	71.5	74.6	77.7
Growing	CCSM45	80.9	82.1	82.9	83.4
Season	CCSM85	80.9	82.4	84.3	86.7
May—Sep	GFDL45	80.9	87.1	85.4	87.4
	GFDL85	80.9	83.9	87.3	91.1
	HAD45	80.9	82.9	84.8	85.6
	HAD85	80.9	83.2	86.5	89.2
Coldest	CCSM45	50.6	52.9	53.5	53.7
Month	CCSM85	50.6	52.8	53.9	55.2
Average	GFDL45	50.6	54.1	54.2	54.4
	GFDL85	50.6	51.7	53.0	53.5
	HAD45	50.6	51.4	53.0	53.7
	HAD85	50.6	53.4	54.8	56.5
Warmest	CCSM45	84.5	85.4	86.0	86.1
Month	CCSM85	84.5	85.8	86.6	87.7
Average	GFDL45	84.5	88.0	88.6	89.7
	GFDL85	84.5	88.3	89.8	92.2
	HAD45	84.5	86.7	87.6	88.0
	HAD85	84.5	87.1	88.8	89.7

Precipitati	ion (in)				
	Scenario	2009	2039	2069	2099
Annual	CCSM45	42.5	43.9	48.6	45.2
Total	CCSM85	42.5	44.6	46.3	45.1
	GFDL45	42.5	42.9	50.1	39.8
	GFDL85	42.5	42.1	43.4	41.8
	HAD45	42.5	44.1	42.0	43.6 ◆◆◆◆
	HAD85	42.5	45.6	40.4	42.4
Growing	CCSM45	19.2	21.1	22.6	20.5
Season	CCSM85	19.2	20.3	20.5	18.7
May—Sep	GFDL45	19.2	20.1	26.2	19.1
	GFDL85	19.2	20.5	21.0	20.7 ◆◆◆◆
	HAD45	19.2	19.1	18.7	20.1
	HAD85	19.2	20.3	18.2	18.6

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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# Climate Change Atlas Tree Species

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# Current and Potential Future Habitat, Capability, and Migration

live oak Quercus virginiana NDH High 47.4 394.3 36.2 Sm. dec. Sm. dec. Medium Common Poor Poor O post oak Quercus stellata WDH High 51.3 293.7 19.0 Sm. dec. Sm. dec. High Common Fair Fair 1 sugarberry Celtis laevigata NDH Medium 40.5 117.8 16.2 Sm. dec. Sm. dec. Medium Common Poor Poor O poor O poor eastern redcedar Juniperus virginiana WDH Medium 35.2 94.5 12.9 Sm. dec. Sm. dec. Medium Common Poor Poor O poor O water oak Quercus nigra WDH High 43.2 70.5 8.8 Sm. inc. Sm. inc. Medium Common Good Good 1 blackjack oak Quercus marilandica NSL Medium 17.1 50.9 7.5 Lg. dec. Lg. dec. High Common Fair Fair Infill + Infill + 1 cedar elm Ulmus crassifolia NDH Medium 33.4 46.3 4.2 Sm. inc. Sm. inc. Low Rare Poor Poor O poor 1 American elm Ulmus americana WDH Medium 20.6 45.3 12.7 Sm. dec. Sm. dec. Sm. dec. Low Rare Very Poor Very Poor O 0
sugarberry Celtis laevigata NDH Medium 40.5 117.8 16.2 Sm. dec. Sm. dec. Medium Common Poor Poor O eastern redcedar Juniperus virginiana WDH Medium 35.2 94.5 12.9 Sm. dec. Sm. dec. Medium Common Poor Poor O water oak Quercus nigra WDH High 43.2 70.5 8.8 Sm. inc. Sm. inc. Medium Common Good Good 1 blackjack oak Quercus marilandica NSL Medium 17.1 50.9 7.5 Lg. dec. Lg. dec. High Common Fair Fair Infill + Infill + 1 cedar elm Ulmus crassifolia NDH Medium 33.4 46.3 4.2 Sm. inc. Sm. inc. Low Rare Poor Poor 0 1 American elm Ulmus americana WDH Medium 20.6 45.3 12.7 Sm. dec. Sm. dec. Medium Rare Very Poor Very Poor 0
eastern redcedar Juniperus virginiana WDH Medium 35.2 94.5 12.9 Sm. dec. Sm. dec. Medium Common Poor Poor 0 water oak Quercus nigra WDH High 43.2 70.5 8.8 Sm. inc. Sm. inc. Medium Common Good Good 1 blackjack oak Quercus marilandica NSL Medium 17.1 50.9 7.5 Lg. dec. Lg. dec. High Common Fair Fair Infill + Infill + 1 cedar elm Ulmus crassifolia NDH Medium 33.4 46.3 4.2 Sm. inc. Sm. inc. Low Rare Poor Poor 1 American elm Ulmus americana WDH Medium 20.6 45.3 12.7 Sm. dec. Sm. dec. Medium Rare Very Poor Very Poor 0
water oak Quercus nigra WDH High 43.2 70.5 8.8 Sm. inc. Sm. inc. Medium Common Good Good 1 blackjack oak Quercus marilandica NSL Medium 17.1 50.9 7.5 Lg. dec. Lg. dec. High Common Fair Fair Infill + Infill + 1 cedar elm Ulmus crassifolia NDH Medium 33.4 46.3 4.2 Sm. inc. Sm. inc. Low Rare Poor Poor 1 American elm Ulmus americana WDH Medium 20.6 45.3 12.7 Sm. dec. Sm. dec. Medium Rare Very Poor Very Poor 0
blackjack oak Quercus marilandica NSL Medium 17.1 50.9 7.5 Lg. dec. Lg. dec. High Common Fair Fair Infill + Infill + 1 cedar elm Ulmus crassifolia NDH Medium 33.4 46.3 4.2 Sm. inc. Sm. inc. Low Rare Poor Poor 1 American elm Ulmus americana WDH Medium 20.6 45.3 12.7 Sm. dec. Sm. dec. Medium Rare Very Poor Very Poor 0
cedar elm Ulmus crassifolia NDH Medium 33.4 46.3 4.2 Sm. inc. Sm. inc. Low Rare Poor Poor 1 American elm Ulmus americana WDH Medium 20.6 45.3 12.7 Sm. dec. Sm. dec. Medium Rare Very Poor Very Poor 0
American elm Ulmus americana WDH Medium 20.6 45.3 12.7 Sm. dec. Sm. dec. Medium Rare Very Poor Very Poor 0
pecan Carya illinoinensis NSH Low 26.9 39.6 11.5 Sm. dec. Sm. dec. Low Rare Very Poor Very Poor 0
green ash Fraxinus pennsylvanica WSH Low 17.4 23.8 9.9 No change No change Medium Rare Poor Poor 1 1
Osage-orange Maclura pomifera NDH <mark>Medium 23.6 20.0</mark> 5.3 Sm. dec. No change High Rare Poor Fair 1 1
loblolly pine Pinus taeda WDH High 6.7 17.4 11.4 No change No change Medium Rare Poor Poor Infill + 1 1
hackberry Celtis occidentalis WDH Medium 2.4 16.3 6.4 Sm. dec. Sm. dec. High Rare Poor Poor Infill + Infill + 2 1
white ash Fraxinus americana WDL Medium 9.2 9.7 10.2 Very Lg. dec. Very Lg. dec. Low Rare Lost Lost 0 1
boxelder Acer negundo WSH Low 8 8.7 11.8 Sm. dec. Sm. dec. High Rare Poor Poor Infill + Infill + 2 1
cittamwood/gum bumelia Sideroxylon lanuginosum ssp. NSL Low 13.4 5.3 3.3 Sm. inc. Sm. inc. High Rare Good Good Infill ++ Infill ++ 1
mockernut hickory Carya alba WDL Medium 5 3.5 2.7 No change No change High Rare Fair Fair Infill + 1nfill + 2 1
black willow Salix nigra NSH Low 3.7 3.5 15.0 Sm. dec. Sm. dec. Low Rare Very Poor Very Poor 0 1
southern red oak Quercus falcata WDL Medium 1.2 1.7 2.4 No change No change High Rare Fair Fair Infill + 1 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1
black hickory Carya texana NDL High 3.8 1.2 1.1 No change No change Medium Rare Poor Poor Infill + 2.2
black cherry Prunus serotina WDL Medium 1.4 1.2 2.0 Sm. dec. Sm. dec. Low Rare Very Poor Very Poor 0 2
red mulberry Morus rubra NSL Low 3.7 1.2 5.0 Sm. dec. Sm. dec. Medium Rare Very Poor Very Poor 0 2
slippery elm Ulmus rubra WSL Low 1.8 1.1 0.7 No change No change Medium Rare Poor Poor Infill + 2 2
American holly Ilex opaca NSL Medium 1.2 1.0 1.4 Sm. dec. Sm. dec. Medium Rare Very Poor Very Poor 0 2
bald cypress Taxodium distichum NSH Medium 0.1 0.8 0.1 Sm. dec. Sm. dec. Medium Rare Very Poor Very Poor 0 2
eastern hophornbeam; ironw Ostrya virginiana WSL Low 0.5 0.5 0.3 Sm. dec. Sm. dec. High Rare Poor Poor 0 2
bur oak Quercus macrocarpa NDH <mark>Medium 3.6</mark> 0.4 1.6 Sm. dec. Sm. dec. High Rare Poor Poor 0 2
sweetgum Liquidambar styraciflua WDH High 1.2 0.4 0.5 Lg. inc. Lg. inc. Medium Rare Good Good 2 2
durand oak Quercus sinuata var. sinuata NSL FIA 1.2 0.3 0.4 Unknown Unknown Medium Rare FIA Only FIA Only 0 2
black walnut Juglans nigra WDH Low 3.6 0.2 0.9 Lg. dec. Lg. dec. Medium Rare Very Poor Very Poor 0.3
sassafras Sassafras albidum WSL Low 1.2 0.2 0.3 Lg. dec. Lg. dec. Medium Rare Very Poor Very Poor 0 3
winged elm Ulmus alata WDL Medium 1.2 0.2 0.2 Lg. inc. Lg. inc. Medium Rare Good Good 2
redbay Persea borbonia NSL Low 3.6 0.1 0.6 Lg. dec. Lg. dec. High Rare Poor Poor 0 3
flowering dogwood Cornus florida WDL Medium 3.6 0.1 0.5 Lg. dec. Lg. dec. Medium Rare Very Poor Very Poor 0.3
sweetbay Magnolia virginiana NSL Medium 3.7 0.1 0.5 Lg. dec. Lg. dec. Medium Rare Very Poor Very Poor 0 3
waterlocust Gleditsia aquatica NSLX FIA 3.7 0.1 0.4 Unknown Unknown Medium Rare FIA Only FIA Only 0.3
common persimmon Diospyros virginiana NSL Low 3.7 0.1 0.4 Lg. dec. Lg. dec. High Rare Poor Poor 0.3
shortleaf pine Pinus echinata WDH High 0 0 0 New Habitat New Habitat Medium Absent New Habitat New Habitat Migrate + 3 3
bitternut hickory Carya cordiformis WSL Low 0 0 Unknown Unknown High Absent Unknown Unknown 0 3
shagbark hickory Carya ovata WSL Medium 0 0 0 Unknown Unknown Medium Absent Unknown Unknown 0 4
sourwood Oxydendrum arboreum NDL High 0 0 0 Unknown Unknown High Absent Unknown Unknown 0 4
black oak Quercus velutina WDH High 0 0 0 Unknown Unknown Medium Modeled Unknown Unknown 0 4
American basswood Tilia americana WSL Medium 0 0 0 Unknown Unknown Medium Absent Unknown Unknown 0 4

