ua 23743

U.S. Census Bureau Urban Areas
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	8,600.0	3,320.5	41

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
Ash	3
Hickory	2
Maple	3
Oak	6
Pine	0
Other	20
	34

Abundance	
Abundant	0
Common	6
Rare	28
Absent	7
	41

	Model Reliability	Adaptability
High	3	13
Medium	16	21
Low	20	6
FIA	3	
	42	**40**

Potential Change in Habitat Suitability	Scenario RCP45	Scenario RCP85
Increase	13	13
No Change	8	8
Decrease	10	10
New	7	7
Unknown	4	4
	42	**42**

Capability to Cope or Persist	Scenario RCP45	Scenario RCP85
Very Good	0	0
Good	11	10
Fair	7	8
Poor	7	7
Very Poor	6	5
FIA Only	1	1
Unknown	1	1
	33	**32**

Migration Potential	SHIFT RCP45	SHIFT RCP85
Likely	1	1
Infill	23	22
Migrate	1	5
	25	**28**

Potential Changes in Climate Variables

Temperature (°F)

	Scenario	2009	2039	2069	2099
Annual Average	CCSM45	49.4	51.4	53.8	54.3
	CCSM85	49.4	52.1	54.8	57.8
	GFDL45	49.4	55.6	54.6	55.8
	GFDL85	49.4	52.5	55.7	60.1
	HAD45	49.4	52.0	55.4	57.1
	HAD85	49.4	52.7	57.3	61.6
Growing Season May—Sep	CCSM45	68.6	71.0	73.0	73.9
	CCSM85	68.6	71.8	74.4	77.9
	GFDL45	68.6	76.4	74.8	76.8
	GFDL85	68.6	72.5	76.0	81.6
	HAD45	68.6	71.0	73.7	75.7
	HAD85	68.6	71.7	76.7	80.7
Coldest Month Average	CCSM45	18.6	20.7	22.8	23.3
	CCSM85	18.6	21.2	22.8	24.8
	GFDL45	18.6	22.1	22.9	23.5
	GFDL85	18.6	21.7	23.4	25.0
	HAD45	18.6	20.1	23.7	23.7
	HAD85	18.6	23.2	26.6	29.3
Warmest Month Average	CCSM45	74.9	77.2	78.7	79.4
	CCSM85	74.9	78.9	80.6	82.6
	GFDL45	74.9	78.4	79.8	81.5
	GFDL85	74.9	79.1	80.6	84.5
	HAD45	74.9	77.2	79.1	79.9
	HAD85	74.9	79.0	81.9	84.3

Precipitation (in)

	Scenario	2009	2039	2069	2099
Annual Total	CCSM45	34.7	33.9	34.8	33.3
	CCSM85	34.7	33.8	34.6	35.6
	GFDL45	34.7	37.4	40.1	39.6
	GFDL85	34.7	37.9	41.4	40.6
	HAD45	34.7	38.1	38.3	38.6
	HAD85	34.7	35.7	35.7	38.0
Growing Season May—Sep	CCSM45	21.3	20.4	20.7	19.8
	CCSM85	21.3	19.8	19.9	20.1
	GFDL45	21.3	22.6	23.6	23.0
	GFDL85	21.3	23.3	24.2	22.8
	HAD45	21.3	22.2	21.7	22.2
	HAD85	21.3	20.7	19.5	19.2

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	64	132.3	13.0	No change	No change	High	Common	Good	Good	Infill ++	Infill ++	1	1
American elm	Ulmus americana	WDH	Medium	68.6	127.0	14.3	No change	No change	Medium	Common	Fair	Fair	Infill +	Infill +	1	2
silver maple	Acer saccharinum	NSH	Low	25.6	106.5	20.1	No change	No change	High	Common	Good	Good	Infill ++	Infill ++	1	3
honeylocust	Gleditsia triacanthos	NSH	Low	47.7	83.2	14.1	No change	No change	High	Common	Good	Good	Infill ++	Infill ++	1	4
slippery elm	Ulmus rubra	WSL	Low	48.8	72.9	9.1	Sm. dec.	Sm. dec.	Medium	Common	Poor	Poor	Infill +	Infill +	0	5
red mulberry	Morus rubra	NSL	Low	44.2	70.9	15.3	Sm. dec.	Sm. dec.	Medium	Common	Poor	Poor	Infill +	Infill +	0	6
bur oak	Quercus macrocarpa	NDH	Medium	30.2	47.5	11.7	Sm. inc.	Sm. inc.	High	Rare	Good	Good	Infill ++	Infill ++	2	7
eastern cottonwood	Populus deltoides	NSH	Low	23.3	42.3	24.0	Sm. inc.	Sm. inc.	Medium	Rare	Fair	Fair	Infill +	Infill +	1	8
black walnut	Juglans nigra	WDH	Low	39.5	42.2	9.1	Sm. inc.	Sm. inc.	Medium	Rare	Fair	Fair	Infill +	Infill +	1	9
boxelder	Acer negundo	WSH	Low	37.2	41.3	14.7	No change	No change	High	Rare	Fair	Fair	Infill +	Infill +	1	10
American basswood	Tilia americana	WSL	Medium	25.6	35.0	7.0	Sm. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			2	11
northern red oak	Quercus rubra	WDH	Medium	33.7	32.9	11.1	No change	Sm. dec.	High	Rare	Fair	Poor	Infill +	Infill +	1	12
eastern redcedar	Juniperus virginiana	WDH	Medium	15.1	22.8	6.0	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	2	13
shagbark hickory	Carya ovata	WSL	Medium	19.8	21.9	9.0	Sm. inc.	Sm. dec.	Medium	Rare	Fair	Very Poor	Infill +		1	14
green ash	Fraxinus pennsylvanica	WSH	Low	15.1	20.8	6.6	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	2	15
black willow	Salix nigra	NSH	Low	14	19.8	18.7	Lg. dec.	Sm. inc.	Low	Rare	Very Poor	Poor		Infill +	2	16
black cherry	Prunus serotina	WDL	Medium	41.9	18.9	6.0	Sm. inc.	No change	Low	Rare	Poor	Very Poor	Infill +		1	17
white oak	Quercus alba	WDH	Medium	18.6	11.1	7.9	Sm. inc.	No change	High	Rare	Good	Fair	Infill ++	Infill +	2	18
eastern hophornbeam; ironw	Ostrya virginiana	WSL	Low	15.1	11.1	6.5	Lg. inc.	Sm. inc.	High	Rare	Good	Good	Infill ++	Infill ++	2	19
wild plum	Prunus americana	NSLX	FIA	4.7	8.6	24.3	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	20
bitternut hickory	Carya cordiformis	WSL	Low	29.1	8.0	2.6	Lg. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	Infill ++	2	21
Ohio buckeye	Aesculus glabra	NSL	Low	10.5	7.8	4.2	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	22
white ash	Fraxinus americana	WDL	Medium	29.1	6.6	1.8	Lg. inc.	Lg. inc.	Low	Rare	Fair	Fair	Infill +	Infill +	2	23
black locust	Robinia pseudoacacia	NDH	Low	9.3	6.5	9.2	No change	Sm. inc.	Medium	Rare	Poor	Fair	Infill +	Infill +	2	24
black oak	Quercus velutina	WDH	High	14	5.2	4.9	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	2	25
Siberian elm	Ulmus pumila	NDH	FIA	4.7	4.8	13.6	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	26
sycamore	Platanus occidentalis	NSL	Low	9.3	3.4	4.9	No change	Sm. inc.	Medium	Rare	Poor	Fair	Infill +	Infill +	2	27
chinkapin oak	Quercus muehlenbergii	NSL	Medium	9.3	2.7	3.8	Sm. dec.	No change	Medium	Rare	Very Poor	Poor			0	28
Osage-orange	Maclura pomifera	NDH	Medium	4.7	2.1	6.1	Lg. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	Infill ++	2	29
black ash	Fraxinus nigra	WSH	Medium	4.7	1.4	3.9	Lg. dec.	Very Lg. dec.	Low	Rare	Very Poor	Lost			0	30
black maple	Acer nigrum	NSH	Low	9.3	1.3	1.9	Sm. dec.	Lg. dec.	High	Rare	Poor	Poor			0	31
ailanthus	Ailanthus altissima	NSL	FIA	4.7	0.9	2.4	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	32
northern pin oak	Quercus ellipsoidalis	NSH	Medium	4.7	0.6	1.7	Lg. dec.	Lg. dec.	High	Rare	Poor	Poor			0	33
serviceberry	Amelanchier spp.	NSL	Low	4.7	0.3	0.7	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	34
American hornbeam; muscle	Carpinus caroliniana	WSL	Low	0	0	0	Unknown	Unknown	Medium	Modeled	Unknown	Unknown			0	35
pecan	Carya illinoinensis	NSH	Low	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat		Migrate ++	3	36
black hickory	Carya texana	NDL	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +	3	37
sugarberry	Celtis laevigata	NDH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate ++	3	38
eastern redbud	Cercis canadensis	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +	3	39
shingle oak	Quercus imbricaria	NDH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Likely +	Likely +	3	40
pin oak	Quercus palustris	NSH	Low	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat			3	41
post oak	Quercus stellata	WDH	High	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +	Migrate ++	3	42