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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 9,813.8 3,789.1 145

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								Potential Change in Habitat Suitability			Capability to Cope or Persist			
Ash	3				Model			Scenario	Scenario		Scenario	Scenario		SHIFT	SHIFT
Hickory	6	Abu	ndance		Reliability	Adaptability		RCP45	RCP85		RCP45	RCP85		RCP45	RCP85
Maple	4	Abundant	3	High	12	20	Increase	22	26	Very Good	8	12	Likely	1	1
Oak	11	Common	23	Medium	23	33	No Change	11	9	Good	18	14	Infill	6	9
Pine	1	Rare	25	Low	25	9	Decrease	15	13	Fair	7	8	Migrate	2	6
Other	26	Absent	12	FIA	3		New	9	10	Poor	6	7	•	9	16
-	51		63		63	62	Unknown	6	5	Very Poor	8	6			
							-	63	63	FIA Only	2	2			
										Unknown	3	2			
Potentia	Potential Changes in Climate Variables											E1			

Potential Changes in Climate Variables

Temperature (°F)												
	Scenario	2009	2039	2069	2099							
Annual	CCSM45	55.9	57.9	59.8	60.1							
Average	CCSM85	55.9	58.5	60.9	64.0							
	GFDL45	55.9	59.9	61.1	62.1							
	GFDL85	55.9	58.9	61.8	65.8							
	HAD45	55.9	58.5	61.4	62.8							
	HAD85	55.9	58.7	63.5	67.1							
Growing	CCSM45	72.3	74.6	76.1	76.7							
Season	CCSM85	72.3	75.4	77.7	81.6							
May—Sep	GFDL45	72.3	77.3	78.6	80.5							
	GFDL85	72.3	76.1	79.5	84.5							
	HAD45	72.3	75.2	77.7	79.2							
	HAD85	72.3	75.5	81.3	84.5							
Coldest	CCSM45	30.3	32.5	33.8	34.3							
Month	CCSM85	30.3	33.3	34.4	36.1							
Average	GFDL45	30.3	34.7	35.0	35.1							
	GFDL85	30.3	32.8	34.0	34.9							
	HAD45	30.3	31.5	34.1	34.1							
	HAD85	30.3	33.2	35.5	37.3							
Warmest	CCSM45	78.6	81.2	82.2	82.7							
Month	CCSM85	78.6	82.2	83.4	85.0							
Average	GFDL45	78.6	83.1	84.6	86.0							
	GFDL85	78.6	83.0	84.7	88.3							
	HAD45	78.6	81.9	83.6	84.4							
	HAD85	78.6	83.0	86.1	87.6							

Precipitation (in)													
	Scenario	2009	2039	2069	2099								
Annual	CCSM45	45.0	43.4	46.6	45.8								
Total	CCSM85	45.0	44.6	46.1	46.2								
	GFDL45	45.0	48.9	50.1	49.3								
	GFDL85	45.0	48.8	55.6	54.4								
	HAD45	45.0	44.9	46.8	47.5 ◆◆◆								
	HAD85	45.0	47.4	43.1	46.1								
Growing	CCSM45	22.2	20.4	21.9	21.4								
Season	CCSM85	22.2	21.5	20.6	20.8 •••								
May—Sep	GFDL45	22.2	24.6	23.2	23.9								
	GFDL85	22.2	24.0	26.8	25.5								
	HAD45	22.2	21.5	22.2	22.2 ***								
	HAD85	22.2	22.9	18.7	19.6								

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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Common Name	Scientific Name	Range				FIAiv ChngCl45	ChngCl85	Adap	Abund	Capabil45	Capabil85	SHIFT45	SHIFT85	SSO N
post oak	Quercus stellata	WDH	High	76.9		21.2 No change	No change	High	Abundant	Very Good	Very Good			1 1
black oak	Quercus velutina	WDH	High	73.2		13.3 No change	Sm. dec.		Abundant	Good	Fair			1 2
eastern redcedar	Juniperus virginiana	WDH	Medium	62.9		10.2 Sm. inc.	Sm. inc.	Medium		Very Good	Very Good			1 3
American elm	Ulmus americana	WDH	Medium	71.7	423.4	J	No change	Medium		Fair	Fair			1 4
black walnut	Juglans nigra	WDH	Low	68.1	420.5		Sm. dec.	Medium	Common	Poor	Poor			0 5
white oak	Quercus alba	WDH	Medium	38.6	365.6		No change	High	Common	Good	Good			1 6
northern red oak	Quercus rubra	WDH	Medium	27.9	219.3		No change	High	Common	Good	Good			1 7
shagbark hickory	Carya ovata	WSL	Medium	42.8	208.0	7.3 Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor			0 8
black hickory	Carya texana	NDL	High	49.9	207.4	4.5 Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1 9
honeylocust	Gleditsia triacanthos	NSH	Low	47.9	205.3	8.0 No change	Sm. inc.	High	Common	Good	Very Good			1 10
hackberry	Celtis occidentalis	WDH	Medium	53.9	193.6	4.7 Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good			1 11
chinkapin oak	Quercus muehlenbergii	NSL	Medium	37.6	146.7	4.8 No change	No change	Medium	Common	Fair	Fair			1 12
bitternut hickory	Carya cordiformis	WSL	Low	31.3	144.5	6.5 No change	Sm. inc.	High	Common	Good	Very Good			1 13
Osage-orange	Maclura pomifera	NDH	Medium	37.3	140.9	6.0 Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good			1 14
mockernut hickory	Carya alba	WDL	Medium	43	139.3	4.2 Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good			1 15
black cherry	Prunus serotina	WDL	Medium	35.1	104.4	3.8 Sm. inc.	Sm. inc.	Low	Common	Fair	Fair			1 16
Shumard oak	Quercus shumardii	NSL	Low	19.8	102.2	5.4 No change	Sm. inc.	High	Common	Good	Very Good			1 17
white ash	Fraxinus americana	WDL	Medium	46.7	101.8	3.0 Lg. inc.	Lg. inc.	Low	Common	Good	Good			1 18
blackjack oak	Quercus marilandica	NSL	Medium	26.3	91.5	3.4 Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			1 19
sycamore	Platanus occidentalis	NSL	Low	13.8	86.7	6.6 Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1 20
slippery elm	Ulmus rubra	WSL	Low	32.2	75.3		Lg. inc.	Medium	Common	Good	Very Good			1 21
pin oak	Quercus palustris	NSH	Low	2.8	68.7		Sm. dec.	Low	Common	Poor	Poor		Infill +	2 22
shingle oak	Quercus imbricaria	NDH	Medium	20.4	63.5	5.3 Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor	Infill +	Infill +	0 23
bur oak	Quercus macrocarpa	NDH	Medium	8.7	63.5	10.7 Sm. dec.	Sm. dec.	High	Common	Fair	Fair			0 24
boxelder	Acer negundo	WSH	Low	5.5	53.2	8.1 Sm. dec.	No change	High	Common	Fair	Good		Infill ++	1 25
common persimmon	Diospyros virginiana	NSL	Low	39.1	50.1	2.1 Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			1 26
red mulberry	Morus rubra	NSL	Low	41.9	49.2	-	Sm. inc.	Medium	Rare	Poor	Fair			1 27
sassafras	Sassafras albidum	WSL	Low	28.5	35.7		Lg. dec.	Medium	Rare	Very Poor	Very Poor			0 28
black willow	Salix nigra	NSH	Low	2	32.1		No change	Low	Rare	Very Poor	Very Poor			2 29
green ash	Fraxinus pennsylvanica	WSH	Low	4.5	31.3	4.5 Sm. inc.	Sm. inc.	Medium	Rare	Fair	Fair	Infill +	Infill +	1 30
pignut hickory	Carya glabra	WDL	Medium	6.3	30.3	7.5 Sm. dec.	No change	Medium	Rare	Very Poor	Poor		Infill +	1 31
silver maple	Acer saccharinum	NSH	Low	3.4	28.0		Sm. dec.	High	Rare	Poor	Poor	Infill +		1 32
eastern redbud	Cercis canadensis	NSL	Low	11	17.3		Lg. inc.	Medium		Good	Good			1 33
eastern white pine	Pinus strobus	WDH	High	0.9		14.0 Lg. dec.	Lg. dec.	Low	Rare	Very Poor	Very Poor			0 34
wild plum	Prunus americana	NSLX	FIA	4.7	15.4		Unknown	Medium		FIA Only	FIA Only			0 35
northern catalpa	Catalpa speciosa	NSHX	FIA	1	11.9		Unknown	Medium	Rare	FIA Only	FIA Only			0 36
river birch	Betula nigra	NSL	Low	0.2	10.0		No change	Medium	Rare	Very Poor	Poor		Infill +	2 37
southern red oak	Quercus falcata	WDL	Medium	0.1	8.1		Lg. inc.	High	Rare	Good	Good			2 38
pecan	Carya illinoinensis	NSH	Low	0.8	8.0	_	Lg. inc.	Low	Rare	Fair	Fair	Infill +	Infill +	2 39
blue ash	Fraxinus quadrangulata	NSL	Low	2.1	5.4	0	Sm. dec.	Low	Rare	Very Poor	Very Poor			0 40
Ohio buckeye	Aesculus glabra	NSL	Low	2	4.6		Sm. dec.	Medium	Rare	Very Poor	Very Poor			0 41
sugar maple	Acer saccharum	WDH	High	4	3.8		Lg. inc.	High	Rare	Good	Good			2 42
eastern hophornbeam; iron		WSL	Low	2.1	3.1	U	Lg. inc.	High	Rare	Good	Good			0 43
flowering dogwood	Cornus florida	WDL	Medium	0.4	2.8		Lg. inc.	Medium		Good	Good	Infill ++	Infill ++	1 44
ailanthus	Ailanthus altissima	NSL	FIA	0.4	2.6	J	Unknown	NA	Rare	NNIS	NNIS	411111 TT	1111111 77	0 45
eastern cottonwood	Populus deltoides	NSH	Low	1	2.5			Medium		Lost	Lost			0 45
	<u>'</u>					- / 0	Very Lg. dec.					Infill	Infill ++	2 47
cittamwood/gum bumelia	Sideroxylon lanuginosum ssp.	. IV2L	Low	5.2	2.3	0.8 Lg. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	1/11111 ++	2 4/



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Common Name	Scientific Name	Range	MR	%Cell	FIAsum	FIAiv	ChngCl45	ChngCl85	Adap	Abund	Capabil45	Capabil85	SHIFT45	SHIFT85	SSO N
serviceberry	Amelanchier spp.	NSL	Low	0.9	1.6	5 1.4	Sm. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0 48
red maple	Acer rubrum	WDH	High	1.9	1.3	0.6	Lg. inc.	Lg. inc.	High	Rare	Good	Good			2 49
winged elm	Ulmus alata	WDL	Medium	0.1	0.8	3 0.1	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2 50
blackgum	Nyssa sylvatica	WDL	Medium	0.1	0.5	0.0	Lg. inc.	Lg. inc.	High	Rare	Good	Good			2 51
ashe juniper	Juniperus ashei	NDH	High	C) () (New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			0 52
shortleaf pine	Pinus echinata	WDH	High	C) () (New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Likely +	Likely +	3 53
loblolly pine	Pinus taeda	WDH	High	C) () (New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate ++	3 54
sugarberry	Celtis laevigata	NDH	Medium	C) () (New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate ++	3 55
black ash	Fraxinus nigra	WSH	Medium	C) () (Unknown	New Habitat	Low	Absent	Unknown	New Habitat			3 56
sweetgum	Liquidambar styraciflua	WDH	High	C) () (New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +	3 57
bigleaf magnolia	Magnolia macrophylla	NSL	Low	C) () (Unknown	Unknown	Medium	Absent	Unknown	Unknown			0 58
bigtooth aspen	Populus grandidentata	NSL	Medium	C) () (Unknown	Unknown	Medium	Absent	Unknown	Unknown			0 59
water oak	Quercus nigra	WDH	High	C) () (New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +	3 60
live oak	Quercus virginiana	NDH	High	C) () (New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3 61
black locust	Robinia pseudoacacia	NDH	Low	C) () (New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +	3 62
cedar elm	Illmus crassifolia	NDH	Medium	C) () (New Hahitat	New Hahitat	Low	Ahsent	New Habitat	New Hahitat	Migrate +	Migrate ++	3 63

