#### 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 10,306 3,979.1 318

#### **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	4				Model			Scenario	Scenario		Scenario	Scenario		SHIFT	SHIFT
Hickory	6	Abu	ndance		Reliability	Adaptability		RCP45	RCP85		RCP45	RCP85		RCP45	RCP85
Maple	2	Abundant	4	High	15	22	Increase	27	31	Very Good	12	14	Likely	0	1
Oak	18	Common	25	Medium	35	52	No Change	19	17	Good	14	12	Infill	15	19
Pine	6	Rare	45	Low	35	12	Decrease	24	22	Fair	11	14	Migrate	1	1
Other	38	Absent	13	FIA	4		New	7	9	Poor	17	16	•	16	21
•	74	_	87	•	89	86	Unknown	12	10	Very Poor	15	11			
							-	89	89	FIA Only	4	4			
										Unknown	8	6			
Potentia	I Change	es in Climate Var	iahles							•	01	77			

#### Potential Changes in Climate Variables

Temperature (°F)											
	Scenario	2009	2039	2069	2099						
Annual	CCSM45	64.2	65.8	67.8	67.8						
Average	CCSM85	64.2	66.1	68.4	71.1						
	GFDL45	64.2	66.8	68.8	69.6						
	GFDL85	64.2	66.7	69.8	73.3						
	HAD45	64.2	66.2	68.8	70.3						
	HAD85	64.2	66.5	70.0	73.8						
Growing	CCSM45	77.2	78.7	80.3	80.7						
Season	CCSM85	77.2	78.7	81.2	84.5						
May—Sep	GFDL45	77.2	79.9	81.7	83.1						
	GFDL85	77.2	79.9	83.1	87.1						
	HAD45	77.2	79.9	82.1	83.8						
	HAD85	77.2	79.8	84.6	88.4						
Coldest	CCSM45	44.7	47.1	47.8	47.8						
Month	CCSM85	44.7	46.8	47.9	49.2						
Average	GFDL45	44.7	47.6	48.0	48.5						
	GFDL85	44.7	46.7	47.8	48.5						
	HAD45	44.7	45.1	46.7	47.2						
	HAD85	44.7	45.8	46.7	48.3						
Warmest	CCSM45	81.6	83.2	84.2	84.3						
Month	CCSM85	81.6	83.5	85.0	86.6						
Average	GFDL45	81.6	83.7	84.6	85.5						
	GFDL85	81.6	84.2	85.7	87.9						
	HAD45	81.6	84.8	85.9	86.6						

89.8

Precipitati	on (in)				
	Scenario	2009	2039	2069	2099
Annual	CCSM45	46.8	50.4	52.6	54.1
Total	CCSM85	46.8	50.8	53.9	58.9
	GFDL45	46.8	52.6	55.9	58.3
	GFDL85	46.8	51.7	58.4	57.7
	HAD45	46.8	47.2	49.2	49.7
	HAD85	46.8	50.2	46.0	47.0
Growing	CCSM45	23.5	27.2	28.6	28.9
Season	CCSM85	23.5	26.0	28.4	30.8
May—Sep	GFDL45	23.5	28.8	31.0	31.8
	GFDL85	23.5	27.7	33.1	33.3
	HAD45	23.5	23.8	24.2	23.6 ◆◆◆◆
	HAD85	23.5	25.0	21.1	20.1

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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HAD85

81.6

85.1

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

Common Name	Scientific Name	Range	MR	%Cell	FIAsum	FIAiv	ChngCl45	ChngCl85	Adap	Abund	Capabil45	Capabil85	SHIFT45	SHIFT85	SSO N
loblolly pine	Pinus taeda	WDH	High	93.2	4506.1	35.2	No change	Sm. dec.	Medium	Abundant	Good	Fair			1 1
sweetgum	Liquidambar styraciflua	WDH	High	91.5	1482.3	11.9	No change	Sm. dec.	Medium	Abundant	Good	Fair			1 2
water oak	Quercus nigra	WDH	High	87.6	772.8	6.4	Sm. inc.	Sm. inc.	Medium	Abundant	Very Good	Very Good			1 3
red maple	Acer rubrum	WDH	High	83.9	672.5	6.1	No change	No change	High	Abundant	Very Good	Very Good			1 4
laurel oak	Quercus laurifolia	NDH	Medium	58.3	427.0	4.5	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1 5
swamp tupelo	Nyssa biflora	NDH	Medium	56.9	407.5	4.3	Sm. inc.	Sm. inc.	Low	Common	Fair	Fair			1 6
longleaf pine	Pinus palustris	NSH	Medium	25.7	246.5	8.1	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1 7
water tupelo	Nyssa aquatica	NSH	Medium	20.7	166.4	8.1	Sm. dec.	Sm. dec.	Low	Common	Poor	Poor			0 8
bald cypress	Taxodium distichum	NSH	Medium	26.1	161.9	5.4	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1 9
pond pine	Pinus serotina	NSH	Medium	14.3	146.7	8.8	Sm. dec.	Sm. dec.	Low	Common	Poor	Poor			0 10
willow oak	Quercus phellos	NSL	Low	30.6	124.5	3.1	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1 11
yellow-poplar	Liriodendron tulipifera	WDH	High	26.9	123.9	3.1	Sm. dec.	Sm. dec.	High	Common	Fair	Fair			1 12
blackgum	Nyssa sylvatica	WDL	Medium	41.1	121.9	2.4	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			1 13
mockernut hickory	Carya alba	WDL	Medium	35.5	110.7	2.7	No change	Sm. inc.	High	Common	Good	Very Good			1 14
black cherry	Prunus serotina	WDL	Medium	39.3	99.8	2.1	Lg. inc.	Lg. inc.	Low	Common	Good	Good			1 15
green ash	Fraxinus pennsylvanica	WSH	Low	32.7	98.5		Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1 16
southern red oak	Quercus falcata	WDL	Medium	25.3	92.0		Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			1 17
redbay	Persea borbonia	NSL	Low	35.9	88.0		No change	No change	High	Common	Good	Good			1 18
American hornbeam; musc	clev Carpinus caroliniana	WSL	Low	20.6	83.3		Sm. inc.	Lg. inc.	Medium	Common	Good	Very Good			1 19
slash pine	Pinus elliottii	NDH	High	17.5	81.7	3.9	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good	Infill ++	Infill ++	1 20
American elm	Ulmus americana	WDH	Medium	27.7	68.9	2.0	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1 21
sweetbay	Magnolia virginiana	NSL	Medium	20	66.9		Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1 22
American holly	Ilex opaca	NSL	Medium	25.2	58.4		Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1 23
post oak	Quercus stellata	WDH	High	28.6	58.0	1.7	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			1 24
sugarberry	Celtis laevigata	NDH	Medium	10.4	57.4	4.0	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good	Infill ++	Infill ++	1 25
black willow	Salix nigra	NSH	Low	19.1	57.4		Sm. inc.	Lg. inc.	Low	Common	Fair	Good			1 26
pond cypress	Taxodium ascendens	NSH	Medium	8.4	55.5	5.6	Sm. inc.	Sm. inc.	Medium	Common	Good	Good	Infill ++	Infill ++	2 27
white oak	Quercus alba	WDH	Medium	22.3	54.5	1.7	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good			1 28
cherrybark oak; swamp red	do: Quercus pagoda	NSL	Medium	16.5	52.1	2.3	No change	No change	Medium	Common	Fair	Fair			1 29
common persimmon	Diospyros virginiana	NSL	Low	18.5	39.4	1.8	Lg. dec.	Lg. dec.	High	Rare	Poor	Poor			1 30
river birch	Betula nigra	NSL	Low	8	37.5	3.9	No change	Sm. inc.	Medium	Rare	Poor	Fair			1 31
sycamore	Platanus occidentalis	NSL	Low	5.9	37.4	3.9	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2 32
shortleaf pine	Pinus echinata	WDH	High	9.1	36.1	3.4	Sm. inc.	Sm. inc.	Medium	Rare	Fair	Fair	Infill +	Infill +	1 33
scarlet oak	Quercus coccinea	WDL	Medium	7.1	33.1	2.5	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0 34
turkey oak	Quercus laevis	NSH	Medium	8.5	32.0	2.6	No change	No change	High	Rare	Fair	Fair	Infill +	Infill +	1 35
pignut hickory	Carya glabra	WDL	Medium	10	31.2	2.0	Sm. dec.	No change	Medium	Rare	Very Poor	Poor		Infill +	1 36
swamp chestnut oak	Quercus michauxii	NSL	Low	11.1	26.5	1.4	Sm. inc.	Sm. inc.	Medium	Rare	Fair	Fair			1 37
water hickory	Carya aquatica	NSL	Medium	9.6	26.1	1.9	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	1 38
flowering dogwood	Cornus florida	WDL	Medium	17.2	25.5	1.0	No change	Sm. inc.	Medium	Rare	Poor	Fair			1 39
live oak	Quercus virginiana	NDH	High	7.2	22.4	1.8	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	2 40
boxelder	Acer negundo	WSH	Low	3.5	21.2	2.6	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor		Infill +	2 41
overcup oak	Quercus lyrata	NSL	Medium	6.8	21.0	2.4	No change	No change	Low	Rare	Very Poor	Very Poor			0 42
spruce pine	Pinus glabra	NSL	Low	4.4	19.0	1.5	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0 43
slippery elm	Ulmus rubra	WSL	Low	19.3	18.8	0.8	Sm. dec.	No change	Medium	Rare	Very Poor	Poor			1 44
hackberry	Celtis occidentalis	WDH	Medium	4.1	18.7	3.3	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor			0 45
eastern redcedar	Juniperus virginiana	WDH	Medium	3.9	18.5	3.7	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2 46
sand hickory	Carya pallida	NSL	FIA	2.9	16.4	3.3	Unknown	Unknown	NA	Rare	FIA Only	FIA Only			0 47



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# Current and Potential Future Habitat, Capability, and Migration

			Cu				iabitat, ca	pabey,	and wingi	ation				eters, Pras
Common Name	Scientific Name	Range				FIAiv ChngCl45	ChngCl85	Adap	Abund	Capabil45	Capabil85	SHIFT45	SHIFT85	SSO N
water elm	Planera aquatica	NSL	Low	6.5	15.8	2.2 No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	1 48
blackjack oak	Quercus marilandica	NSL	Medium	8	15.5	1.4 No change	No change	High	Rare	Fair	Fair	Infill +	Infill +	1 49
winged elm	Ulmus alata	WDL	Medium	12.2	12.4	0.8 Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			1 50
black oak	Quercus velutina	WDH	High	4.3	8.3	0.7 Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			2 51
southern magnolia	Magnolia grandiflora	NSL	Low	2	8.3	2.3 Sm. inc.	Lg. inc.	Medium	Rare	Fair	Good	Infill +	Infill ++	2 52
bluejack oak	Quercus incana	NSL	Low	3.9	7.1	1.8 No change	No change	Medium	Rare	Poor	Poor		Infill +	1 53
eastern cottonwood	Populus deltoides	NSH	Low	2.9	6.0	2.1 Sm. dec.	Very Lg. dec.	Medium	Rare	Very Poor	Lost			0 54
pawpaw	Asimina triloba	NSL	Low	2.3	5.2	1.7 Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0 55
sassafras	Sassafras albidum	WSL	Low	7.3	4.8	0.6 Sm. inc.	Sm. inc.	Medium	Rare	Fair	Fair	Infill +	Infill +	1 56
pecan	Carya illinoinensis	NSH	Low	1.9	3.3	1.7 Sm. dec.	No change	Low	Rare	Very Poor	Very Poor			2 57
American beech	Fagus grandifolia	WDH	High	3.5	3.0	0.5 No change	Sm. inc.	Medium	Rare	Poor	Fair	Infill +		2 58
northern red oak	Quercus rubra	WDH	Medium	1	2.6	2.7 Lg. dec.	Lg. dec.	High	Rare	Poor	Poor		Infill +	2 59
loblolly-bay	Gordonia lasianthus	NSH	Medium	3	2.6	0.5 No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2 60
Carolina ash	Fraxinus caroliniana	NSL	FIA	1	2.3	2.4 Unknown	Unknown	NA	Rare	FIA Only	FIA Only			0 61
shagbark hickory	Carya ovata	WSL	Medium	1.9	2.1	1.1 Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0 62
black walnut	Juglans nigra	WDH	Low	2.2	1.9	0.5 Very Lg. dec.	Very Lg. dec.	Medium	Rare	Lost	Lost			0 63
silverbell	Halesia spp.	NSL	Low	1	1.8	1.8 Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0 64
eastern hophornbeam; iron	w Ostrya virginiana	WSL	Low	1	1.6	1.7 Lg. inc.	Lg. inc.	High	Rare	Good	Good			2 65
bigleaf magnolia	Magnolia macrophylla	NSL	Low	0.7	1.6	1.2 Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0 66
red mulberry	Morus rubra	NSL	Low	1.9	1.6	0.8 Sm. dec.	No change	Medium	Rare	Very Poor	Poor		Infill +	2 67
pumpkin ash	Fraxinus profunda	NSH	FIA	1	1.1	1.1 Unknown	Unknown	NA	Rare	FIA Only	FIA Only			0 68
chestnut oak	Quercus prinus	NDH	High	1	0.8	0.8 Lg. dec.	Lg. dec.	High	Rare	Poor	Poor			0 69
sourwood	Oxydendrum arboreum	NDL	High	5.8	0.7	0.3 Lg. dec.	Very Lg. dec.	High	Rare	Poor	Lost			0 70
wild plum	Prunus americana	NSLX	FIA	1	0.5	0.5 Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0 71
vellow buckeye	Aesculus flava	NSL	Low	0.4	0.4	0.2 Sm. dec.	Sm. dec.	Low	Rare	Very Poor	Very Poor			0 72
white ash	Fraxinus americana	WDL	Medium	1	0.2	0.2 Lg. dec.	Lg. dec.	Low	Rare	Very Poor	Very Poor			0 73
Shumard oak	Quercus shumardii	NSL	Low	1	0.2	0.2 No change	No change	High	Rare	Fair	Fair			0 74
sand pine	Pinus clausa	NDH	High	0	0	0 New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat	Migrate +		3 75
florida maple	Acer barbatum	NSL	Low	0	0	0 Unknown	Unknown	High	Modeled	Unknown	Unknown			0 76
silver maple	Acer saccharinum	NSH	Low	0	0	0 Unknown	Unknown	High	Absent	Unknown	Unknown			0 77
serviceberry	Amelanchier spp.	NSL	Low	0	0	0 New Habitat	New Habitat	_	Absent	New Habitat	New Habitat			3 78
cittamwood/gum bumelia	Sideroxylon lanuginosum ssp		Low	0	0	0 New Habitat			Absent	New Habitat				0 79
shellbark hickory	Carya laciniosa	NSL	Low	0	0	0 New Habitat		-	Absent		New Habitat			3 80
black hickory	Carya texana	NDL	High	0	0	0 New Habitat	New Habitat		Absent	New Habitat	New Habitat			3 81
eastern redbud	Cercis canadensis	NSL	Low	0	0	0 Unknown	New Habitat		Absent	Unknown	New Habitat		Likely +	3 82
black ash	Fraxinus nigra	WSH	Medium	0	0	0 Unknown	New Habitat		Absent	Unknown	New Habitat			3 83
honeylocust	Gleditsia triacanthos	NSH	Low	0	0	0 New Habitat	New Habitat		Absent	New Habitat	New Habitat		Migrate +	
pin cherry	Prunus pensylvanica	NSL	Low	0	0	0 Unknown	Unknown	Medium	Absent	Unknown	Unknown		J. 2.22	0 85
swamp white oak	Quercus bicolor	NSL	Low	0	0	0 Unknown	Unknown	Medium	Modeled	Unknown	Unknown			0 86
chinkapin oak	Quercus muehlenbergii	NSL	Medium	0	0	0 Unknown	Unknown	Medium	Absent	Unknown	Unknown			0 87
American basswood	Tilia americana	WSL	Medium	0	0	0 Unknown	Unknown	Medium	Absent	Unknown	Unknown			0 88
cedar elm	Ulmus crassifolia	NDH	Medium	0	0	0 New Habitat			Absent		New Habitat			0 89
cedar Cilii	Cilitas Crassifolia	NUIT	Wicalulli	U	U	O INCW Habitat	.vcvv ilabitat	LOW	ADJUIL	.vcvv Habitat				0 03

