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 3,979.1 156

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		Model Abundance Reliability Adapta Abundant 1 High 11 17 Common 21 Medium 24 38 Rare 35 Low 24 6					Potential Change in Habitat Suitability			Capability to Cope or Persist				Migration Potential		
Ash	3				Model			Scenario	Scenario		Scenario	Scenario		SHIFT	SHIFT		
Hickory	7	Abu	ndance		Reliability	Adaptability		RCP45	RCP85		RCP45	RCP85		RCP45	RCP85		
Maple	2	Abundant	1	High	11	17	Increase	20	22	Very Good	4	4	Likely	1	1		
Oak	13	Common	21	Medium	24	38	No Change	13	15	Good	15	17	Infill	14	15		
Pine	2	Rare	35	Low	24	6	Decrease	21	17	Fair	15	13	Migrate	1	1		
Other	30	Absent	5	FIA	3		New	4	3	Poor	3	5	·	16	17		
•	57		62	•	62	61	Unknown	4	5	Very Poor	17	15					
							-	62	62	FIA Only	3	3					
										Unknown	1	2					
Potentia	I Change	es in Climate Var	iahles							•	EO	EO					

Potential Changes in Climate Variables

Temperatu	ıre (°F)				
	Scenario	2009	2039	2069	2099
Annual	CCSM45	63.4	64.9	66.6	67.0
Average	CCSM85	63.4	65.6	67.9	70.5
	GFDL45	63.4	67.7	67.8	69.1
	GFDL85	63.4	66.2	69.0	72.7
	HAD45	63.4	65.6	68.4	69.4
	HAD85	63.4	65.9	70.1	73.5
Growing	CCSM45	77.9	79.3	80.7	81.2
Season	CCSM85	77.9	80.5	82.5	85.7
May—Sep	GFDL45	77.9	83.4	83.0	85.5
	GFDL85	77.9	81.7	84.9	89.4
	HAD45	77.9	80.5	83.2	83.8
	HAD85	77.9	81.0	86.1	89.0
Coldest	CCSM45	41.6	43.7	44.7	44.8
Month	CCSM85	41.6	44.0	45.1	46.5
Average	GFDL45	41.6	45.2	45.4	45.4
	GFDL85	41.6	42.7	44.2	44.7
	HAD45	41.6	42.2	44.2	44.5
	HAD85	41.6	44.1	45.8	47.5
Warmest	CCSM45	83.6	84.6	85.2	85.4
Month	CCSM85	83.6	85.9	86.5	88.2
Average	GFDL45	83.6	88.7	88.9	90.7
	GFDL85	83.6	88.3	89.9	93.5
	HAD45	83.6	86.5	87.8	88.0

Precipitati	on (in)				
	Scenario	2009	2039	2069	2099
Annual	CCSM45	45.7	46.6	47.8	47.2 ◆◆◆◆
Total	CCSM85	45.7	45.3	48.5	47.8
	GFDL45	45.7	47.4	54.0	46.8
	GFDL85	45.7	47.4	51.1	50.7
	HAD45	45.7	46.5	47.3	50.0
	HAD85	45.7	50.1	42.8	46.4
Growing	CCSM45	18.3	19.9	18.1	19.0
Season	CCSM85	18.3	18.0	17.4	17.3 ◆◆◆◆
May—Sep	GFDL45	18.3	19.7	23.1	19.7
	GFDL85	18.3	20.2	21.7	20.7
	HAD45	18.3	17.9	17.4	18.3 ◆◆◆◆
	HAD85	18.3	19.0	14.1	14.9

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.

Cite as: Iverson, L.R.; Prasad, A.M.; Peters, M.P.; Matthews, S.N. 2019. Facilitating Adaptive Forest Management under Climate Change: A Spatially Specific Synthesis of 125 Species for Habitat Changes and Assisted Migration over the Eastern United States. Forests. 10(11): 989. https://doi.org/10.3390/f10110989.



HAD85

83.6

87.3

90.8

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

Common Name	Scientific Name	Range	MR	%Cell	FIAsum	FIAiv ChngCl45	ChngCl85	Adap	Abund	Capabil45	Capabil85	SHIFT45	SHIFT85	SSO N
post oak	Quercus stellata	WDH	High	66.4	760.9	16.3 No change	Sm. inc.	High	Abundant	Very Good	Very Good	0		1 1
loblolly pine	Pinus taeda	WDH	High	21.4	497.4	23.9 Lg. inc.	Sm. inc.	J	Common	Very Good	Good	Infill ++	Infill ++	1 2
water oak	Quercus nigra	WDH	High	53.8	454.3	9.4 Sm. inc.	Sm. inc.		Common	Good	Good			1 3
winged elm	Ulmus alata	WDL	Medium	75.4	428.8	7.8 Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1 4
eastern redcedar	Juniperus virginiana	WDH	Medium	67.7	412.4	8.0 Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1 5
southern red oak	Quercus falcata	WDL	Medium	49.3	344.3	8.3 Sm. dec.	No change	High	Common	Fair	Good			1 6
green ash	Fraxinus pennsylvanica	WSH	Low	60.8	303.3	8.1 No change	No change	Medium	Common	Fair	Fair			1 7
sweetgum	Liquidambar styraciflua	WDH	High	25.2	302.9	8.6 Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1 8
sugarberry	Celtis laevigata	NDH	Medium	56.9	221.7	8.7 Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1 9
Osage-orange	•	NDH	Medium	49.2	217.5	6.9 No change	Sm. inc.	High	Common	Good	Very Good			1 10
willow oak	Quercus phellos	NSL	Low	42.7	166.7	5.2 No change	No change	Medium	Common	Fair	Fair			1 11
honeylocust	Gleditsia triacanthos	NSH	Low	45	164.8	8.3 Sm. dec.	No change	High	Common	Fair	Good			1 12
mockernut hickory	Carya alba	WDL	Medium	27	136.8	4.4 No change	No change	High	Common	Good	Good			1 13
cedar elm	Ulmus crassifolia	NDH	Medium	49	126.5	5.6 Lg. inc.	Lg. inc.	Low	Common	Good	Good			1 14
cherrybark oak; swamp red		NSL	Medium	25.6	109.4	4.1 No change	No change	Medium	Common	Fair	Fair	Infill +	Infill +	1 15
shortleaf pine	Pinus echinata	WDH	High	17	103.4	7.3 Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1 16
blackjack oak	Quercus marilandica	NSL	Medium	23.9	95.7	2.7 Sm. inc.	Lg. inc.	High	Common	Very Good	Very Good			1 17
black hickory	Carya texana	NDL	High	19.9	88.2	3.9 No change	No change	_	Common	Fair	Fair	Infill +	Infill +	1 18
American elm	Ulmus americana	WDH	Medium	47	75.4	3.8 Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1 19
Shumard oak	Quercus shumardii	NSL	Low	26.5	72.8	4.1 Sm. dec.	Sm. dec.	High	Common	Fair	Fair			1 20
pecan	Carya illinoinensis	NSH	Low	24.3	69.8	5.7 Lg. inc.	Lg. inc.	Low	Common	Good	Good			1 21
white ash	Fraxinus americana	WDL	Medium	18.1	62.6	3.2 Sm. inc.	Sm. inc.	Low	Common	Fair	Fair	Infill +	Infill +	1 22
bitternut hickory	Carya cordiformis	WSL	Low	5.6	41.6	4.4 Sm. dec.	Sm. dec.	High	Rare	Poor	Poor			1 23
river birch	Betula nigra	NSL	Low	3.4	39.6	3.4 Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0 24
sycamore	Platanus occidentalis	NSL	Low	11.6	34.7	6.9 Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0 25
common persimmon	Diospyros virginiana	NSL	Low	26.9	34.6	2.8 No change	No change	High	Rare	Fair	Fair			1 26
shagbark hickory	Carya ovata	WSL	Medium	11.6	30.6	3.5 Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0 27
boxelder	Acer negundo	WSH	Low	16.9	29.3	3.6 Sm. inc.	Sm. inc.	High	Rare	Good	Good	Infill ++	Infill ++	1 28
red mulberry	Morus rubra	NSL	Low	19.8	28.1	1.9 Sm. dec.	No change	Medium	Rare	Very Poor	Poor			1 29
black oak	Quercus velutina	WDH	High	10.2	24.6	2.5 Sm. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0 30
cittamwood/gum bumelia	Sideroxylon lanuginosum ssp.	NSL	Low	25.9	21.5	1.7 Lg. inc.	Lg. inc.	High	Rare	Good	Good			1 31
overcup oak	Quercus lyrata	NSL	Medium	12.1	21.0	2.4 Sm. dec.	Sm. dec.	Low	Rare	Very Poor	Very Poor			0 32
red maple	Acer rubrum	WDH	High	10.4	20.4	1.9 Sm. inc.	Sm. inc.	High	Rare	Good	Good	Infill ++	Infill ++	1 33
slippery elm	Ulmus rubra	WSL	Low	14	17.8	3.5 Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	1 34
black cherry	Prunus serotina	WDL	Medium	13	17.0	1.4 No change	No change	Low	Rare	Very Poor	Very Poor			0 35
hackberry	Celtis occidentalis	WDH	Medium	9.6	16.8	3.1 No change	No change	High	Rare	Fair	Fair	Infill +	Infill +	2 36
black willow	Salix nigra	NSH	Low	15.3	15.7	9.5 Lg. inc.	Lg. inc.	Low	Rare	Fair	Fair			1 37
water hickory	Carya aquatica	NSL	Medium	4.3	15.2	3.2 Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0 38
blackgum	Nyssa sylvatica	WDL	Medium	3.6	14.2	2.3 No change	No change	High	Rare	Fair	Fair	Infill +	Infill +	1 39
eastern redbud	Cercis canadensis	NSL	Low	9.4	10.3	1.6 Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0 40
black walnut	Juglans nigra	WDH	Low	4.9	9.2	5.1 Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0 41
flowering dogwood	Cornus florida	WDL	Medium	9.1	9.2	1.2 Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0 42
chinkapin oak	Quercus muehlenbergii	NSL	Medium	1.3	8.8	2.9 Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0 43
pignut hickory	Carya glabra	WDL	Medium	2.9	7.9	2.7 Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0 44
eastern hophornbeam; iron	w Ostrya virginiana	WSL	Low	0.1	6.1	0.4 No change	No change	High	Rare	Fair	Fair	Infill +	Infill +	2 45
American hornbeam; muscl	e\ Carpinus caroliniana	WSL	Low	1.9	4.9	0.7 Sm. inc.	Sm. inc.	Medium	Rare	Fair	Fair	Infill +	Infill +	1 46
sassafras	Sassafras albidum	WSL	Low	5.8	4.5	1.7 No change	No change	Medium		Poor	Poor	Infill +	Infill +	2 47
						J								



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

Common Name	Scientific Name	Range	MR	%Cell	FIAsum	FIAiv	ChngCl45	ChngCl85	Adap	Abund	Capabil45	Capabil85	SHIFT45	SHIFT85	SSO N
eastern cottonwood	Populus deltoides	NSH	Low	10.4	4.4	1.9	Sm. inc.	Sm. inc.	Medium	Rare	Fair	Fair	Infill +	Infill +	2 48
Texas ash	Fraxinus texensis	NDH	FIA	0.7	2.6	2.0	Unknown	Unknown	NA	Rare	FIA Only	FIA Only			0 49
white oak	Quercus alba	WDH	Medium	4.8	2.1	. 0.5	Lg. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	Infill ++	2 50
bluejack oak	Quercus incana	NSL	Low	1	2.0	2.1	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0 51
water elm	Planera aquatica	NSL	Low	1.6	1.9	0.9	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0 52
bald cypress	Taxodium distichum	NSH	Medium	0.6	1.€	5 1.1	Sm. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0 53
American holly	Ilex opaca	NSL	Medium	0.6	1.5	0.9	Sm. dec.	No change	Medium	Rare	Very Poor	Poor		Infill +	2 54
bur oak	Quercus macrocarpa	NDH	Medium	8.7	1.3	0.8	Lg. dec.	Lg. dec.	High	Rare	Poor	Poor			0 55
wild plum	Prunus americana	NSLX	FIA	1	0.9	0.9	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0 56
peachleaf willow	Salix amygdaloides	NSLX	FIA	3.9	0.5	1.9	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0 57
ashe juniper	Juniperus ashei	NDH	High	C	C) (New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			0 58
slash pine	Pinus elliottii	NDH	High	C	, c) 0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Likely +	Likely +	3 59
serviceberry	Amelanchier spp.	NSL	Low	C) (Unknown	Unknown	Medium	Absent	Unknown	Unknown			0 60
pin cherry	Prunus pensylvanica	NSL	Low	C	, c) 0	New Habitat	Unknown	Medium	Absent	New Habitat	Unknown			3 61
live oak	Quercus virginiana	NDH	High	C) (New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate ++	Migrate ++	3 62

