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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	9,400.0	3,629.4	254

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	2
Hickory	6
Maple	5
Oak	13
Pine	7
Other	41
	74

Abundance	
Abundant	6
Common	26
Rare	42
Absent	15
	89

	Model Reliability	Adaptability
High	22	23
Medium	30	52
Low	35	13
FIA	5	
	92	**88**

Potential Change in Habitat Suitability	Scenario RCP45	Scenario RCP85
Increase	26	32
No Change	14	12
Decrease	29	25
New	12	12
Unknown	11	11
	92	**92**

Capability to Cope or Persist	Scenario RCP45	Scenario RCP85
Very Good	10	12
Good	17	21
Fair	10	6
Poor	12	14
Very Poor	18	16
FIA Only	2	2
Unknown	6	6
	75	**77**

Migration Potential	SHIFT RCP45	SHIFT RCP85
Likely	1	1
Infill	9	10
Migrate	5	5
	15	**16**

Potential Changes in Climate Variables

Temperature (°F)

	Scenario	2009	2039	2069	2099
Annual Average	CCSM45	59.9	61.7	63.7	63.8
	CCSM85	59.9	62.1	64.5	67.3
	GFDL45	59.9	62.8	64.9	65.7
	GFDL85	59.9	62.8	66.0	69.7
	HAD45	59.9	62.2	65.1	66.4
	HAD85	59.9	62.4	66.5	70.6
Growing Season May—Sep	CCSM45	73.8	75.6	77.4	77.8
	CCSM85	73.8	75.8	78.3	82.0
	GFDL45	73.8	77.2	79.3	80.6
	GFDL85	73.8	77.2	80.8	85.0
	HAD45	73.8	76.9	79.6	81.1
	HAD85	73.8	76.8	82.4	86.6
Coldest Month Average	CCSM45	39.5	41.9	42.7	42.7
	CCSM85	39.5	42.1	43.1	44.2
	GFDL45	39.5	42.7	42.9	43.5
	GFDL85	39.5	41.5	42.5	43.2
	HAD45	39.5	39.7	41.5	41.9
	HAD85	39.5	40.5	41.7	43.2
Warmest Month Average	CCSM45	78.8	80.9	81.9	81.9
	CCSM85	78.8	81.1	82.6	84.4
	GFDL45	78.8	81.8	82.8	83.8
	GFDL85	78.8	82.4	84.3	86.7
	HAD45	78.8	82.4	84.2	84.9
	HAD85	78.8	83.0	86.5	88.8

Precipitation (in)

	Scenario	2009	2039	2069	2099
Annual Total	CCSM45	49.0	52.8	55.7	56.8
	CCSM85	49.0	53.3	56.5	62.5
	GFDL45	49.0	54.9	58.7	61.8
	GFDL85	49.0	53.6	60.2	60.2
	HAD45	49.0	49.3	52.5	53.8
	HAD85	49.0	54.6	50.0	52.7
Growing Season May—Sep	CCSM45	20.2	22.9	24.8	25.7
	CCSM85	20.2	22.5	23.5	26.2
	GFDL45	20.2	24.5	27.2	27.9
	GFDL85	20.2	23.2	28.2	28.3
	HAD45	20.2	20.1	20.6	21.6
	HAD85	20.2	23.5	19.2	19.4

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.

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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	62.8	1314.2	21.7	Sm. inc.	Sm. inc.	Medium	Abundant	Very Good	Very Good			1	1
sweetgum	Liquidambar styraciflua	WDH	High	73.4	818.4	11.7	Sm. inc.	Sm. inc.	Medium	Abundant	Very Good	Very Good			1	2
yellow-poplar	Liriodendron tulipifera	WDH	High	79.8	800.0	11.0	Lg. dec.	Lg. dec.	High	Abundant	Good	Good			1	3
Virginia pine	Pinus virginiana	NDH	High	55.3	757.6	14.3	Lg. dec.	Lg. dec.	Medium	Abundant	Fair	Fair			0	4
white oak	Quercus alba	WDH	Medium	78.7	730.7	9.5	Sm. dec.	Sm. dec.	High	Abundant	Good	Good			1	5
red maple	Acer rubrum	WDH	High	83	509.5	6.3	No change	No change	High	Abundant	Very Good	Very Good			1	6
water oak	Quercus nigra	WDH	High	63.8	469.9	8.6	Sm. inc.	Lg. inc.	Medium	Common	Good	Very Good			1	7
shortleaf pine	Pinus echinata	WDH	High	62.8	379.5	6.3	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	8
black cherry	Prunus serotina	WDL	Medium	70.2	361.9	5.3	No change	No change	Low	Common	Poor	Poor			0	9
sourwood	Oxydendrum arboreum	NDL	High	59.6	269.2	4.4	Sm. dec.	Sm. dec.	High	Common	Fair	Fair			1	10
southern red oak	Quercus falcata	WDL	Medium	58.5	248.6	5.0	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	11
chestnut oak	Quercus prinus	NDH	High	20.2	218.0	10.6	Sm. dec.	Sm. dec.	High	Common	Fair	Fair			1	12
scarlet oak	Quercus coccinea	WDL	Medium	36.2	183.9	5.0	Sm. dec.	Sm. dec.	Medium	Common	Poor	Poor			0	13
northern red oak	Quercus rubra	WDH	Medium	35.1	169.7	4.7	No change	No change	High	Common	Good	Good			1	14
eastern redcedar	Juniperus virginiana	WDH	Medium	51.1	167.3	3.4	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	15
mockernut hickory	Carya alba	WDL	Medium	50	155.8	3.3	Sm. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	16
river birch	Betula nigra	NSL	Low	17	136.3	7.8	No change	Sm. inc.	Medium	Common	Fair	Good			1	17
black oak	Quercus velutina	WDH	High	44.7	127.6	3.0	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	18
pignut hickory	Carya glabra	WDL	Medium	42.6	119.1	3.0	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	19
flowering dogwood	Cornus florida	WDL	Medium	55.3	101.6	1.9	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	20
American beech	Fagus grandifolia	WDH	High	34	89.1	2.6	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	21
green ash	Fraxinus pennsylvanica	WSH	Low	26.6	86.3	3.7	Sm. inc.	Lg. inc.	Medium	Common	Good	Very Good			1	22
blackgum	Nyssa sylvatica	WDL	Medium	51.1	83.5	1.7	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	23
American hornbeam; muscle	Carpinus caroliniana	WSL	Low	26.6	79.8	2.9	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	24
black locust	Robinia pseudoacacia	NDH	Low	12.8	75.1	5.8	Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor			0	25
sycamore	Platanus occidentalis	NSL	Low	18.1	67.2	3.6	No change	Sm. inc.	Medium	Common	Fair	Good			1	26
American holly	Ilex opaca	NSL	Medium	37.2	66.7	2.0	No change	Sm. inc.	Medium	Common	Fair	Good			1	27
winged elm	Ulmus alata	WDL	Medium	23.4	63.6	2.7	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	28
pecan	Carya illinoinensis	NSH	Low	4.3	61.8	14.2	Sm. dec.	No change	Low	Common	Poor	Poor		Infill +	0	29
post oak	Quercus stellata	WDH	High	31.9	60.7	1.9	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	30
willow oak	Quercus phellos	NSL	Low	18.1	51.9	3.5	No change	Sm. inc.	Medium	Common	Fair	Good			1	31
eastern white pine	Pinus strobus	WDH	High	8.5	51.3	5.9	No change	No change	Low	Common	Poor	Poor	Infill +	Infill +	0	32
common persimmon	Diospyros virginiana	NSL	Low	27.7	48.7	2.0	Lg. dec.	Sm. dec.	High	Rare	Poor	Poor			1	33
ailanthus	Ailanthus altissima	NSL	FIA	5.3	45.0	8.3	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	34
white ash	Fraxinus americana	WDL	Medium	21.3	38.2	2.1	Sm. inc.	Lg. inc.	Low	Rare	Poor	Fair			1	35
black willow	Salix nigra	NSH	Low	8.5	36.8	4.2	No change	Sm. inc.	Low	Rare	Very Poor	Poor			1	36
eastern hemlock	Tsuga canadensis	NSH	High	5.3	33.7	6.2	No change	No change	Low	Rare	Very Poor	Very Poor			2	37
pitch pine	Pinus rigida	NSH	High	11.7	30.5	3.7	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	38
red mulberry	Morus rubra	NSL	Low	8.5	28.1	3.2	No change	No change	Medium	Rare	Poor	Poor			1	39
boxelder	Acer negundo	WSH	Low	12.8	24.7	3.9	Lg. dec.	Sm. dec.	High	Rare	Poor	Poor			1	40
eastern cottonwood	Populus deltoides	NSH	Low	1.1	18.6	17.2	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	41
sweet birch	Betula lenta	NDH	High	4.3	17.7	4.1	No change	No change	Low	Rare	Very Poor	Very Poor			2	42
shagbark hickory	Carya ovata	WSL	Medium	9.6	14.7	5.1	Lg. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	43
sugarberry	Celtis laevigata	NDH	Medium	6.4	14.5	2.2	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	2	44
black walnut	Juglans nigra	WDH	Low	9.6	14.5	1.5	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	45
American elm	Ulmus americana	WDH	Medium	7.4	13.5	1.8	Sm. inc.	Lg. inc.	Medium	Rare	Fair	Good	Infill +	Infill ++	2	46
florida maple	Acer barbatum	NSL	Low	9.6	13.0	1.3	No change	Sm. inc.	High	Rare	Fair	Good	Infill +	Infill ++	1	47

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Common Name	Scientific Name	Range	MR	%Cell	FIAsum	FIAiv	ChngCl45	ChngCl85	Adap	Abund	Capabil45	Capabil85	SHIFT45	SHIFT85	SSO	N
cucumbertree	Magnolia acuminata	NSL	Low	5.3	12.3	2.3	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	48
bitternut hickory	Carya cordiformis	WSL	Low	6.4	9.2	1.4	Lg. dec.	Lg. dec.	High	Rare	Poor	Poor			0	49
sassafras	Sassafras albidum	WSL	Low	8.5	8.0	0.9	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			1	50
paulownia	Paulownia tomentosa	NSL	FIA	2.1	7.9	3.6	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	51
slippery elm	Ulmus rubra	WSL	Low	6.4	7.2	1.1	Very Lg. dec.	Sm. dec.	Medium	Rare	Lost	Very Poor			0	52
silverbell	Halesia spp.	NSL	Low	4.3	7.0	1.6	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	53
eastern redbud	Cercis canadensis	NSL	Low	8.5	6.9	0.8	Sm. dec.	No change	Medium	Rare	Very Poor	Poor			1	54
eastern hophornbeam; ironw	Ostrya virginiana	WSL	Low	5.3	5.7	1.1	Lg. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	Infill ++	1	55
sugar maple	Acer saccharum	WDH	High	1.1	5.4	4.9	Sm. dec.	Lg. dec.	High	Rare	Poor	Poor	Infill +		2	56
sand hickory	Carya pallida	NSL	FIA	5.3	5.4	1.0	Unknown	Unknown	NA	Rare	FIA Only	FIA Only			0	57
swamp tupelo	Nyssa biflora	NDH	Medium	1.1	5.1	4.7	Lg. inc.	Lg. inc.	Low	Rare	Fair	Fair	Infill +	Infill +	2	58
swamp chestnut oak	Quercus michauxii	NSL	Low	1.1	5.0	4.6	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			2	59
slash pine	Pinus elliottii	NDH	High	1.1	4.2	3.9	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	60
laurel oak	Quercus laurifolia	NDH	Medium	2.1	4.1	1.9	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	2	61
blackjack oak	Quercus marilandica	NSL	Medium	2.1	3.5	1.6	Lg. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	Infill ++	2	62
mountain or Fraser magnolia	Magnolia fraseri	NSL	Low	2.1	3.1	1.4	No change	No change	Low	Rare	Very Poor	Very Poor			0	63
chinkapin oak	Quercus muehlenbergii	NSL	Medium	1.1	3.1	2.8	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	64
wild plum	Prunus americana	NSLX	FIA	2.1	1.9	0.9	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	65
honeylocust	Gleditsia triacanthos	NSH	Low	1.1	1.7	1.6	Lg. inc.	Lg. inc.	High	Rare	Good	Good			2	66
American basswood	Tilia americana	WSL	Medium	2.1	1.6	0.8	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			2	67
serviceberry	Amelanchier spp.	NSL	Low	3.2	1.5	0.5	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	68
hackberry	Celtis occidentalis	WDH	Medium	1.1	1.0	1.0	Very Lg. dec.	No change	High	Rare	Lost	Fair		Infill +	2	69
yellow buckeye	Aesculus flava	NSL	Low	1.1	0.9	0.9	Lg. dec.	Lg. dec.	Low	Rare	Very Poor	Very Poor			0	70
white mulberry	Morus alba	NSL	FIA	1.1	0.7	0.6	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	71
striped maple	Acer pensylvanicum	NSL	Medium	1.1	0.6	0.6	Sm. dec.	No change	Medium	Rare	Very Poor	Poor			0	72
Table Mountain pine	Pinus pungens	NSL	Low	1.1	0.5	0.5	Lg. dec.	Lg. dec.	High	Rare	Poor	Poor			0	73
pawpaw	Asimina triloba	NSL	Low	1.1	0.3	0.3	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	74
ashe juniper	Juniperus ashei	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			0	75
spruce pine	Pinus glabra	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	76
longleaf pine	Pinus palustris	NSH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate ++	Migrate ++	3	77
black maple	Acer nigrum	NSH	Low	0	0	0	Unknown	Unknown	High	Absent	Unknown	Unknown			0	78
yellow birch	Betula alleghaniensis	NDL	High	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	79
cittamwood/gum bumelia	Sideroxylon lanuginosum ssp.	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			3	80
shellbark hickory	Carya laciniosa	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	81
black hickory	Carya texana	NDL	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	82
black ash	Fraxinus nigra	WSH	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat			3	83
southern magnolia	Magnolia grandiflora	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	84
sweetbay	Magnolia virginiana	NSL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	85
bigleaf magnolia	Magnolia macrophylla	NSL	Low	0	0	0	Unknown	Unknown	Medium	Modeled	Unknown	Unknown			0	86
cherrybark oak; swamp red o	Quercus pagoda	NSL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate ++	Migrate ++	3	87
turkey oak	Quercus laevis	NSH	Medium	0	0	0	Unknown	Unknown	High	Modeled	Unknown	Unknown			0	88
overcup oak	Quercus lyrata	NSL	Medium	0	0	0	Unknown	Unknown	Low	Modeled	Unknown	Unknown			0	89
live oak	Quercus virginiana	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate ++	Migrate ++	3	90
bluejack oak	Quercus incana	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Likely +	Likely +	3	91
cedar elm	Ulmus crassifolia	NDH	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat			0	92