

	sq. km	sq. mi	FIA Plots
Area of Region	111,769	43,154	3,700

Species Information

The columns below provide brief 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	Abundance	Model Reliability	Adaptability	Potential Change in Habitat Suitability			Capability to Cope or Persist			Migration Potential			
					Scenario RCP45	Scenario RCP85	Scenario RCP45	Scenario RCP85	SHIFT RCP45	SHIFT RCP85				
Ash	4		High	18	29	Increase	36	39	Very Good	14	14	Likely	1	1
Hickory	9	Common	Medium	40	60	No Change	27	27	Good	20	23	Infill	25	29
Maple	4	Rare	Low	40	14	Decrease	27	24	Fair	8	8	Migrate	0	0
Oak	22	Absent	FIA	10		New	4	4	Poor	27	26		26	30
Pine	8					Unknown	14	14	Very Poor	21	19			
Other	53						108	108	FIA Only	8	8			
	100	108		108	103				Unknown	4	4			
										102	102			
Potential Changes in Climate Variables														

Potential Changes in Climate Variables

Temperature (°F)

	Scenario	2009	2039	2069	2099	
Annual Average	CCSM45	65.8	67.4	69.2	69.3	
	CCSM85	65.8	67.6	70.0	72.4	
	GFDL45	65.8	68.5	70.2	71.0	
	GFDL85	65.8	68.2	71.3	74.7	
	HAD45	65.8	68.0	70.6	72.0	
	HAD85	65.8	68.2	71.9	75.6	
Growing Season May—Sep	CCSM45	78.0	79.4	80.8	81.2	
	CCSM85	78.0	79.4	81.9	84.8	
	GFDL45	78.0	80.7	82.4	83.7	
	GFDL85	78.0	80.6	83.6	87.6	
	HAD45	78.0	81.1	83.3	84.7	
	HAD85	78.0	81.0	86.1	89.4	
Coldest Month Average	CCSM45	47.2	49.4	50.3	50.0	
	CCSM85	47.2	49.4	50.6	51.8	
	GFDL45	47.2	50.4	50.6	50.9	
	GFDL85	47.2	49.0	50.0	50.6	
	HAD45	47.2	47.3	48.8	49.6	
	HAD85	47.2	48.5	49.6	51.4	
Warmest Month Average	CCSM45	81.5	82.8	83.4	83.7	
	CCSM85	81.5	82.8	84.0	85.7	
	GFDL45	81.5	84.2	84.7	85.6	
	GFDL85	81.5	83.7	85.1	87.3	
	HAD45	81.5	85.2	86.6	87.2	
	HAD85	81.5	85.4	88.4	89.8	

Precipitation (in)

	Scenario	2009	2039	2069	2099	
Annual Total	CCSM45	58.0	60.7	64.2	64.1	
	CCSM85	58.0	61.4	63.4	68.2	
	GFDL45	58.0	64.3	68.3	68.8	
	GFDL85	58.0	63.7	67.0	66.5	
	HAD45	58.0	55.9	60.7	62.3	
	HAD85	58.0	61.5	55.3	58.3	
Growing Season May—Sep	CCSM45	24.9	26.8	27.8	27.9	
	CCSM85	24.9	25.3	26.9	28.2	
	GFDL45	24.9	29.8	32.5	31.1	
	GFDL85	24.9	30.2	33.2	33.5	
	HAD45	24.9	23.9	25.4	25.5	
	HAD85	24.9	25.7	20.6	21.5	

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>.

Section 232B

EcoMap 2007

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
loblolly pine	Pinus taeda	WDH	High	85.3	3421.0	33.5	No change	No change	Medium	Abundant	Good	Good			1	1
slash pine	Pinus elliottii	NDH	High	43.6	1079.0	19.0	Sm. inc.	Sm. inc.	Medium	Abundant	Very Good	Very Good			1	2
water oak	Quercus nigra	WDH	High	85.1	858.4	8.5	Sm. inc.	Sm. inc.	Medium	Abundant	Very Good	Very Good			1	3
sweetgum	Liquidambar styraciflua	WDH	High	75.3	698.9	7.7	Sm. inc.	Sm. inc.	Medium	Abundant	Very Good	Very Good			1	4
longleaf pine	Pinus palustris	NSH	Medium	37.2	622.6	13.9	Sm. inc.	Sm. inc.	Medium	Abundant	Very Good	Very Good			1	5
laurel oak	Quercus laurifolia	NDH	Medium	53.3	439.6	6.9	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	6
sweetbay	Magnolia virginiana	NSL	Medium	48.1	325.3	5.7	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	7
swamp tupelo	Nyssa biflora	NDH	Medium	30.7	265.9	6.8	Sm. inc.	Sm. inc.	Low	Common	Fair	Fair			1	8
blackgum	Nyssa sylvatica	WDL	Medium	59.5	248.6	3.6	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good			1	9
red maple	Acer rubrum	WDH	High	65.1	226.9	3.0	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	10
yellow-poplar	Liriodendron tulipifera	WDH	High	44.6	224.2	4.4	No change	No change	High	Common	Good	Good			1	11
shortleaf pine	Pinus echinata	WDH	High	31.3	186.4	5.3	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	12
southern red oak	Quercus falcata	WDL	Medium	45.3	157.0	3.1	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	13
live oak	Quercus virginiana	NDH	High	15.7	131.0	6.7	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good	Infill ++	Infill ++	1	14
black cherry	Prunus serotina	WDL	Medium	49.5	129.6	2.3	Lg. inc.	Lg. inc.	Low	Common	Good	Good			1	15
sand pine	Pinus clausa	NDH	High	3.9	123.3	19.9	No change	No change	Low	Common	Poor	Poor	Infill +	Infill +	2	16
white oak	Quercus alba	WDH	Medium	31.6	108.1	2.9	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good			1	17
post oak	Quercus stellata	WDH	High	29.1	87.2	2.6	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	18
American hornbeam; muscley	Carpinus caroliniana	WSL	Low	25.6	78.7	2.5	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	19
flowering dogwood	Cornus florida	WDL	Medium	40.8	71.5	1.6	No change	Sm. inc.	Medium	Common	Fair	Good			1	20
green ash	Fraxinus pennsylvanica	WSH	Low	16.1	65.1	3.0	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	21
southern magnolia	Magnolia grandiflora	NSL	Low	20.6	64.8	2.7	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	22
pond cypress	Taxodium ascendens	NSH	Medium	5.7	63.1	6.7	No change	No change	Medium	Common	Fair	Fair	Infill +	Infill +	2	23
spruce pine	Pinus glabra	NSL	Low	18.8	61.9	2.7	Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor			0	24
bald cypress	Taxodium distichum	NSH	Medium	8.5	61.6	5.8	No change	No change	Medium	Common	Fair	Fair	Infill +	Infill +	1	25
American holly	Ilex opaca	NSL	Medium	30.3	61.1	1.8	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	26
turkey oak	Quercus laevis	NSH	Medium	9.3	59.5	5.1	No change	No change	High	Common	Good	Good	Infill ++	Infill ++	1	27
water tupelo	Nyssa aquatica	NSH	Medium	5.2	53.1	7.6	No change	No change	Low	Common	Poor	Poor	Infill +	Infill +	2	28
mockernut hickory	Carya alba	WDL	Medium	24.5	49.3	1.7	Lg. inc.	Lg. inc.	High	Rare	Good	Good			1	29
pignut hickory	Carya glabra	WDL	Medium	18.1	49.1	2.2	No change	No change	Medium	Rare	Poor	Poor			1	30
willow oak	Quercus phellos	NSL	Low	9.8	44.7	3.3	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	1	31
common persimmon	Diospyros virginiana	NSL	Low	26.8	41.8	1.1	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor			1	32
American beech	Fagus grandifolia	WDH	High	13.2	39.5	2.5	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	1	33
sugarberry	Celtis laevigata	NDH	Medium	9.2	38.6	3.5	Sm. inc.	Sm. inc.	Medium	Rare	Fair	Fair	Infill +	Infill +	1	34
winged elm	Ulmus alata	WDL	Medium	16.6	35.9	1.6	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			1	35
eastern redcedar	Juniperus virginiana	WDH	Medium	13.8	34.8	2.0	Sm. inc.	Lg. inc.	Medium	Rare	Fair	Good	Infill +	Infill ++	1	36
American elm	Ulmus americana	WDH	Medium	13.3	31.9	1.6	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	1	37
eastern hophornbeam; ironw	Ostrya virginiana	WSL	Low	11	27.5	2.1	Lg. inc.	Lg. inc.	High	Rare	Good	Good			1	38
black willow	Salix nigra	NSH	Low	6.2	26.6	3.4	No change	Sm. inc.	Low	Rare	Very Poor	Poor		Infill +	1	39
redbay	Persea borbonia	NSL	Low	13.8	25.6	1.5	Sm. inc.	Sm. inc.	High	Rare	Good	Good			1	40
sourwood	Oxydendrum arboreum	NDL	High	15.3	22.1	1.3	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor			1	41
cherrybark oak; swamp red o	Quercus pagoda	NSL	Medium	8.6	21.3	1.6	No change	Sm. inc.	Medium	Rare	Poor	Fair	Infill +	Infill +	1	42
swamp chestnut oak	Quercus michauxii	NSL	Low	8.6	21.2	1.8	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	1	43
overcup oak	Quercus lyrata	NSL	Medium	4.9	20.7	3.7	No change	No change	Low	Rare	Very Poor	Very Poor			2	44
pecan	Carya illinoensis	NSH	Low	4.6	19.4	3.3	No change	No change	Low	Rare	Very Poor	Very Poor			2	45
sycamore	Platanus occidentalis	NSL	Low	5.7	16.2	2.4	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	46
sassafras	Sassafras albidum	WSL	Low	13.5	14.5	1.0	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			1	47

Common Name	Scientific Name	Range	MR	%Cell	FIAsum	FIAiv	ChngCl45	ChngCl85	Adap	Abund	Capabil45	Capabil85	SHIFT45	SHIFT85	SSO	N
blackjack oak	Quercus marilandica	NSL	Medium	7.9	14.3	1.8	Sm. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	Infill ++	1	48
Atlantic white-cedar	Chamaecyparis thyoides	NSH	Low	1.8	14.0	6.3	No change	No change	Low	Rare	Very Poor	Very Poor			2	49
water hickory	Carya aquatica	NSL	Medium	3.5	13.9	3.3	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	50
river birch	Betula nigra	NSL	Low	4	11.6	2.3	Sm. inc.	Lg. inc.	Medium	Rare	Fair	Good	Infill +	Infill ++	1	51
bluejack oak	Quercus incana	NSL	Low	4.7	10.6	1.7	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	52
pond pine	Pinus serotina	NSH	Medium	1.3	10.3	3.2	No change	No change	Low	Rare	Very Poor	Very Poor			2	53
florida maple	Acer barbatum	NSL	Low	5.5	10.3	1.6	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor	Infill +	Infill +	1	54
black oak	Quercus velutina	WDH	High	5.1	8.5	1.3	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			2	55
loblolly-bay	Gordonia lasianthus	NSH	Medium	1.3	7.3	2.2	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	56
slippery elm	Ulmus rubra	WSL	Low	4	7.0	1.3	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	57
red mulberry	Morus rubra	NSL	Low	4.5	6.5	1.1	Sm. dec.	No change	Medium	Rare	Very Poor	Poor		Infill +	1	58
boxelder	Acer negundo	WSH	Low	2.1	6.3	1.5	Sm. dec.	No change	High	Rare	Poor	Fair	Infill +	Infill +	2	59
shagbark hickory	Carya ovata	WSL	Medium	2.3	5.4	1.6	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	60
Nuttall oak	Quercus texana	NSH	Medium	1.2	4.6	3.2	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor			0	61
eastern redbud	Cercis canadensis	NSL	Low	4	4.6	0.9	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	62
Shumard oak	Quercus shumardii	NSL	Low	1.9	4.5	1.6	Sm. dec.	No change	High	Rare	Poor	Fair		Infill +	2	63
black walnut	Juglans nigra	WDH	Low	0.7	4.4	4.0	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	64
white ash	Fraxinus americana	WDL	Medium	2.5	4.3	1.0	No change	No change	Low	Rare	Very Poor	Very Poor			2	65
bigleaf magnolia	Magnolia macrophylla	NSL	Low	2.4	3.8	1.2	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			2	66
hackberry	Celtis occidentalis	WDH	Medium	1.8	3.8	2.0	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor	Infill +	Infill +	2	67
American basswood	Tilia americana	WSL	Medium	1.1	3.7	2.8	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	68
eastern cottonwood	Populus deltoides	NSH	Low	0.8	3.3	2.8	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	69
bitternut hickory	Carya cordiformis	WSL	Low	2	3.1	1.2	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor			0	70
northern red oak	Quercus rubra	WDH	Medium	1	2.7	1.4	Sm. dec.	Lg. dec.	High	Rare	Poor	Poor			0	71
cucumbertree	Magnolia acuminata	NSL	Low	1.6	2.6	1.4	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			2	72
Carolina ash	Fraxinus caroliniana	NSL	FIA	0.6	2.1	2.0	Unknown	Unknown	NA	Rare	FIA Only	FIA Only			0	73
water elm	Planera aquatica	NSL	Low	1.4	2.0	1.4	No change	No change	Medium	Rare	Poor	Poor		Infill +	2	74
durand oak	Quercus sinuata var. sinuata	NSL	FIA	0.3	1.6	1.6	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	75
scarlet oak	Quercus coccinea	WDL	Medium	1.4	1.6	1.0	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	76
wild plum	Prunus americana	NSLX	FIA	2	1.4	0.6	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	77
pumpkin ash	Fraxinus profunda	NSH	FIA	0.5	1.0	1.7	Unknown	Unknown	NA	Rare	FIA Only	FIA Only			0	78
chinkapin oak	Quercus muehlenbergii	NSL	Medium	0.4	1.0	1.7	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	79
pawpaw	Asimina triloba	NSL	Low	0.3	0.6	0.8	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	80
sand hickory	Carya pallida	NSL	FIA	0.4	0.5	1.0	Unknown	Unknown	NA	Rare	FIA Only	FIA Only			0	81
serviceberry	Amelanchier spp.	NSL	Low	0.5	0.5	0.9	No change	No change	Medium	Rare	Poor	Poor			0	82
honeylocust	Gleditsia triacanthos	NSH	Low	0.3	0.5	0.8	Sm. inc.	Lg. inc.	High	Rare	Good	Good			2	83
chestnut oak	Quercus prinus	NDH	High	0.5	0.5	0.9	Sm. dec.	Lg. dec.	High	Rare	Poor	Poor			0	84
shellbark hickory	Carya laciniosa	NSL	Low	0.2	0.5	1.5	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	85
cabbage palmetto	Sabal palmetto	NDH	Medium	0.1	0.4	0.3	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			0	86
waterlocust	Gleditsia aquatica	NSLX	FIA	0.4	0.4	1.1	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	87
silverbell	Halesia spp.	NSL	Low	0.1	0.4	0.3	No change	No change	Medium	Rare	Poor	Poor			0	88
Virginia pine	Pinus virginiana	NDH	High	0.4	0.4	1.1	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	89
white mulberry	Morus alba	NSL	FIA	0.2	0.3	1.2	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	90
cedar elm	Ulmus crassifolia	NDH	Medium	0.2	0.3	0.9	Lg. inc.	Lg. inc.	Low	Rare	Fair	Fair	Infill +	Infill +	2	91
pin cherry	Prunus pensylvanica	NSL	Low	0.4	0.2	0.5	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	92
Osage-orange	Maclura pomifera	NDH	Medium	0.1	0.2	0.5	Sm. inc.	Lg. inc.	High	Rare	Good	Good			2	93
ogeechee tupelo	Nyssa ogeche	NSLX	FIA	0.1	0.2	2.1	Unknown	Unknown	Low	Rare	FIA Only	FIA Only			0	94

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Common Name	Scientific Name	Range	MR	%Cell	FIAsum	FIAiv	ChngCI45	ChngCI85	Adap	Abund	Capabil45	Capabil85	SHIFT45	SHIFT85	SSO	N
black hickory	Carya texana	NDL	High	0.2	0.2	0.4	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	95
black locust	Robinia pseudoacacia	NDH	Low	0.2	0.2	0.5	Sm. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	96
silver maple	Acer saccharinum	NSH	Low	0.1	0.0	0.5	Sm. inc.	Sm. inc.	High	Rare	Good	Good			2	97
Kentucky coffeetree	Gymnocladus dioicus	NSLX	FIA	0.1	0.0	0.4	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	98
paulownia	Paulownia tomentosa	NSL	FIA	0.1	0.0	0.4	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	99
bur oak	Quercus macrocarpa	NDH	Medium	0.1	0.0	0.3	Lg. dec.	Lg. dec.	High	Rare	Poor	Poor			0	100
Table Mountain pine	Pinus pungens	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			3	101
striped maple	Acer pensylvanicum	NSL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	102
sugar maple	Acer saccharum	WDH	High	0	0	0	Unknown	Unknown	High	Absent	Unknown	Unknown			0	103
mountain maple	Acer spicatum	NSL	Low	0	0	0	Unknown	Unknown	High	Absent	Unknown	Unknown			0	104
yellow buckeye	Aesculus flava	NSL	Low	0	0	0	Unknown	Unknown	Low	Absent	Unknown	Unknown			0	105
cittamwood/gum bumelia	Sideroxylon lanuginosum ssp.	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Likely +	Likely +	3	106
black ash	Fraxinus nigra	WSH	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat			3	107
quaking aspen	Populus tremuloides	WDH	High	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	108