

Current and Potential Future Habitat, Capability, and Migration

	sq. km	sq. mi	FIA Plots
Area of Region	28,103	10,850	183

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		Potential Change in Habitat Suitability		Capability to Cope or Persist		Migration Potential					
				Reliability	Adaptability	Scenario RCP45	Scenario RCP85	Scenario RCP45	Scenario RCP85	SHIFT RCP45	SHIFT RCP85				
Ash	4			High	18	23	Increase	17	18	Very Good	2	1	Likely	0	0
Hickory	4			Medium	30	44	No Change	16	15	Good	16	17	Infill	33	33
Maple	6	Abundant	2	Low	31	16	Decrease	29	29	Fair	9	9	Migrate	3	4
Oak	9	Common	19	FIA	9		New	12	12	Poor	16	17			
Pine	4	Rare	50				Unknown	14	14	Very Poor	18	15			
Other	44	Absent	14							FIA Only	4	4			
										Unknown	5	5			
	71		85		88	83		88	88		70	68		36	37

Potential Changes in Climate Variables

Temperature (°F)

	Scenario	2009	2039	2069	2099	
Annual Average	CCSM45	48.7	50.6	53.3	53.4	
	CCSM85	48.7	51.2	54.0	57.2	
	GFDL45	48.7	54.2	54.5	55.5	
	GFDL85	48.7	51.9	55.5	60.0	
	HAD45	48.7	51.9	55.3	57.1	
	HAD85	48.7	52.1	56.6	61.9	
Growing Season (May—Sep)	CCSM45	66.3	68.0	70.4	70.8	
	CCSM85	66.3	68.8	71.3	75.2	
	GFDL45	66.3	73.0	73.3	74.8	
	GFDL85	66.3	70.3	74.6	79.7	
	HAD45	66.3	69.8	72.4	74.8	
	HAD85	66.3	69.4	74.5	80.0	
Coldest Month (Average)	CCSM45	21.7	23.4	25.9	25.8	
	CCSM85	21.7	24.4	26.2	28.2	
	GFDL45	21.7	24.6	25.9	26.5	
	GFDL85	21.7	24.9	26.3	28.2	
	HAD45	21.7	23.3	27.0	27.0	
	HAD85	21.7	25.3	28.1	31.5	
Warmest Month (Average)	CCSM45	72.3	74.3	75.9	76.2	
	CCSM85	72.3	75.5	77.2	79.3	
	GFDL45	72.3	75.4	77.3	78.3	
	GFDL85	72.3	76.4	78.5	81.6	
	HAD45	72.3	76.2	78.1	79.7	
	HAD85	72.3	76.8	80.2	84.1	

Precipitation (in)

	Scenario	2009	2039	2069	2099	
Annual Total	CCSM45	33.9	34.0	33.5	34.9	
	CCSM85	33.9	34.7	34.6	35.4	
	GFDL45	33.9	36.5	40.1	40.4	
	GFDL85	33.9	36.2	40.5	42.1	
	HAD45	33.9	34.7	36.3	36.0	
	HAD85	33.9	36.4	34.1	37.3	
Growing Season (May—Sep)	CCSM45	17.0	17.1	16.3	16.6	
	CCSM85	17.0	16.6	16.5	15.9	
	GFDL45	17.0	17.7	19.0	19.3	
	GFDL85	17.0	18.0	18.5	18.7	
	HAD45	17.0	16.8	15.6	16.4	
	HAD85	17.0	16.9	13.7	14.7	

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 222U

EcoMap 2007
Climate Change Atlas Tree Species

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Northern Research Station
Landscape Change Research Group
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Common Name	Scientific Name	Range	MR	%Cell	FIAsum	FIAiv	ChngCl45	ChngCl85	Adap	Abund	Capabil45	Capabil85	SHIFT45	SHIFT85	SSO	N
green ash	Fraxinus pennsylvanica	WSH	Low	49.2	508.2	15.4	No change	Sm. dec.	Medium	Abundant	Good	Fair	Infill ++	Infill +	1	1
red maple	Acer rubrum	WDH	High	43.3	504.6	16.6	Sm. dec.	Lg. dec.	High	Abundant	Good	Good	Infill ++	Infill ++	1	2
American elm	Ulmus americana	WDH	Medium	56.7	226.5	6.8	Sm. inc.	Sm. inc.	Medium	Common	Good	Good	Infill ++	Infill ++	1	3
quaking aspen	Populus tremuloides	WDH	High	15.7	206.6	9.3	Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor	Infill +	Infill +	2	4
black cherry	Prunus serotina	WDL	Medium	30.8	167.2	6.1	Sm. inc.	No change	Low	Common	Fair	Poor	Infill +	Infill +	1	5
American basswood	Tilia americana	WSL	Medium	31.4	160.2	8.9	Sm. dec.	Lg. dec.	Medium	Common	Poor	Poor	Infill +	Infill +	0	6
eastern cottonwood	Populus deltoides	NSH	Low	15.8	146.7	10.4	Sm. inc.	Sm. inc.	Medium	Common	Good	Good	Infill ++	Infill ++	2	7
boxelder	Acer negundo	WSH	Low	14.6	123.6	15.9	Sm. dec.	Sm. dec.	High	Common	Fair	Fair	Infill +	Infill +	2	8
northern red oak	Quercus rubra	WDH	Medium	27.9	117.8	6.7	No change	No change	High	Common	Good	Good	Infill ++	Infill ++	1	9
shagbark hickory	Carya ovata	WSL	Medium	23.6	116.6	11.3	Sm. dec.	Lg. dec.	Medium	Common	Poor	Poor	Infill +	Infill +	2	10
eastern white pine	Pinus strobus	WDH	High	8.2	114.1	14.4	Sm. dec.	Lg. dec.	Low	Common	Poor	Very Poor	Infill +		2	11
sugar maple	Acer saccharum	WDH	High	24.1	113.3	8.9	Sm. inc.	No change	High	Common	Very Good	Good	Infill ++	Infill ++	2	12
white ash	Fraxinus americana	WDL	Medium	31.6	97.1	5.8	Sm. inc.	Sm. inc.	Low	Common	Fair	Fair	Infill +	Infill +	1	13
silver maple	Acer saccharinum	NSH	Low	9	73.5	6.3	No change	No change	High	Common	Good	Good	Infill ++	Infill ++	2	14
white oak	Quercus alba	WDH	Medium	17.1	72.5	8.3	Lg. inc.	Sm. inc.	High	Common	Very Good	Very Good	Infill ++	Infill ++	2	15
paper birch	Betula papyrifera	WDH	High	6	70.9	4.6	Sm. dec.	Sm. dec.	Medium	Common	Poor	Poor	Infill +	Infill +	2	16
bur oak	Quercus macrocarpa	NDH	Medium	18.8	65.6	10.3	No change	No change	High	Common	Good	Good	Infill ++	Infill ++	2	17
northern pin oak	Quercus ellipsoidalis	NSH	Medium	4.5	61.8	11.7	Sm. dec.	Sm. dec.	High	Common	Fair	Fair	Infill +	Infill +	2	18
black walnut	Juglans nigra	WDH	Low	17.1	60.0	10.5	Sm. inc.	Sm. inc.	Medium	Common	Good	Good	Infill ++	Infill ++	2	19
bigtooth aspen	Populus grandidentata	NSL	Medium	5.3	59.0	9.0	Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor	Infill +		2	20
Scots pine	Pinus sylvestris	NSH	FIA	5.7	53.0	15.1	Unknown	Unknown	NA	Common	NNIS	NNIS			0	21
red pine	Pinus resinosa	NSH	Medium	2.5	44.8	6.4	Sm. dec.	Sm. dec.	Low	Rare	Very Poor	Very Poor			2	22
black oak	Quercus velutina	WDH	High	7.2	41.9	8.4	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	23
swamp white oak	Quercus bicolor	NSL	Low	9.9	41.7	6.2	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	24
northern white-cedar	Thuja occidentalis	WSH	High	2	35.6	9.1	Lg. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			2	25
hackberry	Celtis occidentalis	WDH	Medium	16.9	33.2	12.4	Lg. inc.	Lg. inc.	High	Rare	Good	Good			2	26
bitternut hickory	Carya cordiformis	WSL	Low	17.3	32.2	4.5	Sm. inc.	Sm. inc.	High	Rare	Good	Good			2	27
eastern hophornbeam; ironw	Ostrya virginiana	WSL	Low	14.9	31.4	3.1	Lg. dec.	Lg. dec.	High	Rare	Poor	Poor	Infill +	Infill +	2	28
black ash	Fraxinus nigra	WSH	Medium	5.9	28.6	9.6	Lg. dec.	Lg. dec.	Low	Rare	Very Poor	Very Poor			2	29
slippery elm	Ulmus rubra	WSL	Low	15.9	28.5	5.3	Sm. dec.	No change	Medium	Rare	Very Poor	Poor		Infill +	2	30
sassafras	Sassafras albidum	WSL	Low	9	25.2	5.4	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	31
jack pine	Pinus banksiana	NSH	Medium	1.3	24.4	16.3	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor	Infill +	Infill +	2	32
scarlet oak	Quercus coccinea	WDL	Medium	5.9	19.6	26.8	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	33
American beech	Fagus grandifolia	WDH	High	11.1	17.6	3.2	Lg. inc.	Sm. inc.	Medium	Rare	Good	Fair		Infill +	2	34
pin oak	Quercus palustris	NSH	Low	11.3	17.4	5.4	Lg. inc.	Lg. inc.	Low	Rare	Fair	Fair	Infill +	Infill +	2	35
white spruce	Picea glauca	NSL	Medium	0.4	16.5	15.8	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	36
eastern redcedar	Juniperus virginiana	WDH	Medium	0.9	14.6	8.6	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	37
Norway spruce	Picea abies	NSH	FIA	1.7	12.8	19.5	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	38
peachleaf willow	Salix amygdaloides	NSLX	FIA	1.3	12.8	19.0	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	39
blackgum	Nyssa sylvatica	WDL	Medium	3.1	11.1	2.4	No change	No change	High	Rare	Fair	Fair	Infill +	Infill +	2	40
black willow	Salix nigra	NSH	Low	3.6	10.8	3.8	No change	Sm. inc.	Low	Rare	Very Poor	Poor		Infill +	2	41
American hornbeam; musclev	Carpinus caroliniana	WSL	Low	5.8	7.8	2.1	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			2	42
pignut hickory	Carya glabra	WDL	Medium	5.6	7.5	3.2	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	43
yellow birch	Betula alleghaniensis	NDL	High	1	7.5	3.0	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			2	44
white mulberry	Morus alba	NSL	FIA	6.2	7.3	5.1	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	45
serviceberry	Amelanchier spp.	NSL	Low	1.8	6.3	1.4	Lg. dec.	Very Lg. dec.	Medium	Rare	Very Poor	Lost			0	46
honeylocust	Gleditsia triacanthos	NSH	Low	5.4	5.7	11.2	No change	Sm. inc.	High	Rare	Fair	Good	Infill +		2	47



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Common Name	Scientific Name	Range	MR	%Cell	FIAsum	FIAiv	ChngCl45	ChngCl85	Adap	Abund	Capabil45	Capabil85	SHIFT45	SHIFT85	SSO	N
Siberian elm	Ulmus pumila	NDH	FIA	1.8	5.5	5.7	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	48
Ohio buckeye	Aesculus glabra	NSL	Low	7.6	5.2	3.6	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			2	49
rock elm	Ulmus thomasii	NSLX	FIA	0.4	5.0	14.1	Unknown	Unknown	Low	Rare	FIA Only	FIA Only			0	50
mockernut hickory	Carya alba	WDL	Medium	2.3	4.9	3.6	No change	No change	High	Rare	Fair	Fair	Infill +	Infill +	2	51
sycamore	Platanus occidentalis	NSL	Low	6.3	4.7	8.6	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	52
balsam fir	Abies balsamea	NDH	High	0.5	4.3	2.2	Lg. dec.	Lg. dec.	Low	Rare	Very Poor	Very Poor			0	53
pin cherry	Prunus pensylvanica	NSL	Low	1.3	3.8	1.4	Very Lg. dec.	Very Lg. dec.	Medium	Rare	Lost	Lost			0	54
black maple	Acer nigrum	NSH	Low	1.6	3.2	4.2	Sm. dec.	Lg. dec.	High	Rare	Poor	Poor			0	55
winged elm	Ulmus alata	WDL	Medium	0.4	3.1	8.8	No change	Lg. inc.	Medium	Rare	Poor	Good			2	56
eastern hemlock	Tsuga canadensis	NSH	High	0.6	2.5	0.5	Lg. dec.	Very Lg. dec.	Low	Rare	Very Poor	Lost			2	57
flowering dogwood	Cornus florida	WDL	Medium	5	1.9	1.3	Sm. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	58
Osage-orange	Maclura pomifera	NDH	Medium	1.5	1.9	3.7	Sm. inc.	Lg. inc.	High	Rare	Good	Good			2	59
butternut	Juglans cinerea	NSLX	FIA	1.8	1.8	2.1	Unknown	Unknown	Low	Rare	FIA Only	FIA Only			0	60
red mulberry	Morus rubra	NSL	Low	3.1	1.6	4.6	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	61
black locust	Robinia pseudoacacia	NDH	Low	1.8	1.4	6.3	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	62
tamarack (native)	Larix laricina	NSH	High	0.2	1.1	2.0	No change	No change	Low	Rare	Very Poor	Very Poor			2	63
chinkapin oak	Quercus muehlenbergii	NSL	Medium	2.8	0.8	1.8	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	64
eastern redbud	Cercis canadensis	NSL	Low	2.5	0.8	3.4	Sm. inc.	Sm. inc.	Medium	Rare	Fair	Fair	Infill +	Infill +	2	65
blue ash	Fraxinus quadrangulata	NSL	Low	2.8	0.7	4.0	Sm. dec.	Sm. dec.	Low	Rare	Very Poor	Very Poor			0	66
chokecherry	Prunus virginiana	NSLX	FIA	1.2	0.6	1.7	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	67
American mountain-ash	Sorbus americana	NSL	Low	0.6	0.4	1.9	Lg. dec.	Lg. dec.	Low	Rare	Very Poor	Very Poor			0	68
Norway maple	Acer platanoides	NSL	FIA	1.4	0.3	2.8	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	69
balsam poplar	Populus balsamifera	NSH	Medium	0.4	0.2	0.7	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	70
yellow-poplar	Liriodendron tulipifera	WDH	High	0.5	0.2	0.7	Lg. inc.	Lg. inc.	High	Rare	Good	Good			2	71
ashe juniper	Juniperus ashei	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			0	72
striped maple	Acer pensylvanicum	NSL	Medium	0	0	0	Unknown	Unknown	Medium	Modeled	Unknown	Unknown			0	73
mountain maple	Acer spicatum	NSL	Low	0	0	0	Unknown	Unknown	High	Absent	Unknown	Unknown			0	74
pawpaw	Asimina triloba	NSL	Low	0	0	0	Unknown	Unknown	Medium	Modeled	Unknown	Unknown			0	75
pecan	Carya illinoensis	NSH	Low	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat			3	76
black hickory	Carya texana	NDL	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	77
sugarberry	Celtis laevigata	NDH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	78
common persimmon	Diospyros virginiana	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			3	79
sweetgum	Liquidambar styraciflua	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	80
cucumbertree	Magnolia acuminata	NSL	Low	0	0	0	Unknown	Unknown	Medium	Modeled	Unknown	Unknown			0	81
shingle oak	Quercus imbricaria	NDH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	82
blackjack oak	Quercus marilandica	NSL	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			3	83
Shumard oak	Quercus shumardii	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat		Migrate +	3	84
post oak	Quercus stellata	WDH	High	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate ++	Migrate ++	3	85
live oak	Quercus virginiana	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			0	86
bluejack oak	Quercus incana	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	87
cedar elm	Ulmus crassifolia	NDH	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat			0	88