

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

sq. km    sq. mi    FIA Plots  
Area of Region    24,703    9,537.9    1,317

#### 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	Scenario	Scenario	Scenario	SHIFT	SHIFT			
				High	Low	RCP45	RCP85	RCP45	RCP85	RCP45	RCP85			
Ash	3			16	22	Increase	20	20	Very Good	8	6	Likely	0	0
Hickory	2			26	39	No Change	15	13	Good	11	16	Infill	13	12
Maple	7	Abundant	4	26	12	Decrease	13	15	Fair	13	9	Migrate	5	7
Oak	6	Common	26	9		New	16	18	Poor	9	11		<b>18</b>	<b>19</b>
Pine	4	Rare	27			Unknown	13	11	Very Poor	6	4			
Other	35	Absent	20						FIA Only	5	5			
	<b>57</b>		<b>77</b>	<b>77</b>	<b>73</b>		<b>77</b>	<b>77</b>	Unknown	4	2			
										<b>56</b>	<b>53</b>			

#### Potential Changes in Climate Variables

##### Temperature (°F)

Scenario	2009	2039	2069	2099		
Annual	CCSM45	40.3	41.8	44.4	44.4	
Average	CCSM85	40.3	42.5	45.1	48.0	
	GFDL45	40.3	42.8	45.1	46.3	
	GFDL85	40.3	43.1	46.0	50.3	
	HAD45	40.3	43.0	45.9	47.5	
	HAD85	40.3	43.4	46.9	51.6	
Growing Season	CCSM45	56.8	58.3	60.6	60.7	
	CCSM85	56.8	59.1	61.4	64.9	
May—Sep	GFDL45	56.8	59.7	62.6	64.3	
	GFDL85	56.8	60.3	63.7	68.5	
	HAD45	56.8	59.6	61.9	63.8	
	HAD85	56.8	59.6	63.3	68.0	
Coldest Month	CCSM45	13.9	15.1	17.2	17.5	
Average	CCSM85	13.9	15.4	17.2	19.3	
	GFDL45	13.9	16.7	18.2	18.6	
	GFDL85	13.9	17.2	18.6	21.2	
	HAD45	13.9	15.2	18.7	18.6	
	HAD85	13.9	18.2	20.7	23.8	
Warmest Month	CCSM45	62.0	63.8	65.1	65.4	
Average	CCSM85	62.0	64.7	66.3	68.4	
	GFDL45	62.0	65.1	66.4	67.7	
	GFDL85	62.0	65.8	67.6	70.4	
	HAD45	62.0	65.0	66.2	67.6	
	HAD85	62.0	65.6	67.5	70.8	

##### Precipitation (in)

Scenario	2009	2039	2069	2099		
Annual	CCSM45	26.5	27.5	26.9	27.1	
Total	CCSM85	26.5	26.0	26.3	26.8	
	GFDL45	26.5	29.0	30.2	28.6	
	GFDL85	26.5	28.9	31.3	30.2	
	HAD45	26.5	27.8	27.8	28.2	
	HAD85	26.5	27.3	28.5	29.8	
Growing Season	CCSM45	16.3	16.5	15.5	16.0	
	CCSM85	16.3	15.8	15.4	14.7	
May—Sep	GFDL45	16.3	17.6	17.9	16.5	
	GFDL85	16.3	17.6	18.1	16.3	
	HAD45	16.3	16.2	15.2	15.4	
	HAD85	16.3	15.7	14.5	14.8	

**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>.

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
red maple	Acer rubrum	WDH	High	92.5	1511.1	13.4	No change	Sm. dec.	High	Abundant	Very Good	Good			1	1
quaking aspen	Populus tremuloides	WDH	High	86.1	1318.8	12.6	Sm. dec.	Sm. dec.	Medium	Abundant	Fair	Fair			0	2
sugar maple	Acer saccharum	WDH	High	76.8	1022.3	10.5	Sm. dec.	Sm. dec.	High	Abundant	Good	Good			1	3
northern red oak	Quercus rubra	WDH	Medium	57.2	542.2	7.1	Sm. inc.	No change	High	Abundant	Very Good	Very Good			1	4
balsam fir	Abies balsamea	NDH	High	48.8	450.7	7.1	Sm. dec.	Sm. dec.	Low	Common	Poor	Poor			0	5
black ash	Fraxinus nigra	WSH	Medium	61.5	412.0	5.8	No change	No change	Low	Common	Poor	Poor			0	6
American elm	Ulmus americana	WDH	Medium	67.4	408.8	5.1	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	7
paper birch	Betula papyrifera	WDH	High	78.3	405.1	4.2	No change	No change	Medium	Common	Fair	Fair			1	8
American basswood	Tilia americana	WSL	Medium	67.4	393.1	5.0	Sm. inc.	No change	Medium	Common	Good	Fair			1	9
eastern white pine	Pinus strobus	WDH	High	44.9	358.0	6.2	Sm. inc.	No change	Low	Common	Fair	Poor			1	10
red pine	Pinus resinosa	NSH	Medium	27.3	354.4	9.4	Sm. inc.	Sm. inc.	Low	Common	Fair	Fair			1	11
tamarack (native)	Larix laricina	NSH	High	34.3	302.3	6.5	No change	No change	Low	Common	Poor	Poor			0	12
black cherry	Prunus serotina	WDL	Medium	73.6	300.4	3.3	Lg. inc.	Lg. inc.	Low	Common	Good	Good			1	13
bigtooth aspen	Populus grandidentata	NSL	Medium	51.9	251.0	3.8	No change	No change	Medium	Common	Fair	Fair			1	14
northern pin oak	Quercus ellipsoidalis	NSH	Medium	25.2	240.0	8.0	Sm. inc.	No change	High	Common	Very Good	Good			1	15
white oak	Quercus alba	WDH	Medium	37.7	225.8	4.8	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good	Infill ++	Infill ++	1	16
black spruce	Picea mariana	NSH	High	28.6	223.1	5.6	Sm. dec.	Lg. dec.	Medium	Common	Poor	Poor			0	17
white ash	Fraxinus americana	WDL	Medium	55.2	201.3	3.2	Sm. inc.	Sm. inc.	Low	Common	Fair	Fair			1	18
boxelder	Acer negundo	WSH	Low	18.4	200.8	8.6	Sm. inc.	No change	High	Common	Very Good	Good	Infill ++	Infill ++	1	19
northern white-cedar	Thuja occidentalis	WSH	High	22.1	195.4	6.0	No change	Sm. inc.	Medium	Common	Fair	Good	Infill +	Infill ++	1	20
bur oak	Quercus macrocarpa	NDH	Medium	35.8	191.8	5.2	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	21
yellow birch	Betula alleghaniensis	NDL	High	50.5	172.3	2.7	Sm. dec.	Sm. dec.	Medium	Common	Poor	Poor			0	22
eastern hophornbeam; ironw	Ostrya virginiana	WSL	Low	61.6	153.9	2.3	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good			1	23
white spruce	Picea glauca	NSL	Medium	34.8	150.5	3.4	No change	No change	Medium	Common	Fair	Fair			1	24
green ash	Fraxinus pennsylvanica	WSH	Low	44.4	140.0	2.8	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	25
eastern hemlock	Tsuga canadensis	NSH	High	27.3	127.6	3.3	No change	No change	Low	Common	Poor	Poor			0	26
black oak	Quercus velutina	WDH	High	8.9	97.3	8.4	Sm. inc.	Sm. inc.	Medium	Common	Good	Good	Infill ++	Infill ++	1	27
silver maple	Acer saccharinum	NSH	Low	7.5	95.6	8.0	No change	No change	High	Common	Good	Good	Infill ++	Infill ++	1	28
bitternut hickory	Carya cordiformis	WSL	Low	25.9	71.3	2.6	No change	Sm. inc.	High	Common	Good	Very Good	Infill ++	Infill ++	1	29
American hornbeam; muscle	Carpinus caroliniana	WSL	Low	37.8	50.4	1.2	Sm. dec.	Sm. dec.	Medium	Common	Poor	Poor			0	30
jack pine	Pinus banksiana	NSH	Medium	8.9	45.1	3.6	No change	No change	High	Rare	Fair	Fair	Infill +	Infill +	1	31
slippery elm	Ulmus rubra	WSL	Low	13.6	31.1	1.5	Sm. inc.	Lg. inc.	Medium	Rare	Fair	Good	Infill +	Infill ++	1	32
chokecherry	Prunus virginiana	NSLX	FIA	17.5	23.4	1.0	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	33
butternut	Juglans cinerea	NSLX	FIA	9.9	21.9	1.7	Unknown	Unknown	Low	Rare	FIA Only	FIA Only			0	34
river birch	Betula nigra	NSL	Low	2	15.3	3.0	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	35
red mulberry	Morus rubra	NSL	Low	0.4	15.2	37.5	Lg. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			2	36
Scots pine	Pinus sylvestris	NSH	FIA	1	13.0	1.4	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	37
eastern cottonwood	Populus deltoides	NSH	Low	2.2	12.6	3.6	No change	Sm. inc.	Medium	Rare	Poor	Fair	Infill +	Infill +	2	38
black walnut	Juglans nigra	WDH	Low	3.6	12.5	2.6	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	2	39
hackberry	Celtis occidentalis	WDH	Medium	4.3	11.5	2.1	No change	Sm. inc.	High	Rare	Fair	Good	Infill +		2	40
black locust	Robinia pseudoacacia	NDH	Low	1.2	11.2	9.2	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	2	41
pin cherry	Prunus pensylvanica	NSL	Low	11.4	10.8	0.7	Lg. dec.	Very Lg. dec.	Medium	Rare	Very Poor	Lost			0	42
serviceberry	Amelanchier spp.	NSL	Low	13.7	9.4	0.6	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	43
Siberian elm	Ulmus pumila	NDH	FIA	0.8	9.0	11.1	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	44
black maple	Acer nigrum	NSH	Low	2	8.7	4.3	Sm. dec.	Lg. dec.	High	Rare	Poor	Poor			0	45
shagbark hickory	Carya ovata	WSL	Medium	1.3	8.0	2.5	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	46
black willow	Salix nigra	NSH	Low	1.4	6.2	3.7	No change	Sm. inc.	Low	Rare	Very Poor	Poor		Infill +	2	47

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
wild plum	Prunus americana	NSLX	FIA	2.3	4.6	1.8	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	48
Ohio buckeye	Aesculus glabra	NSL	Low	0.4	4.2	10.4	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	49
eastern redcedar	Juniperus virginiana	WDH	Medium	0.9	2.3	1.7	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	50
Norway maple	Acer platanoides	NSL	FIA	0.4	1.8	4.5	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	51
swamp white oak	Quercus bicolor	NSL	Low	1.8	1.5	0.7	Sm. inc.	Lg. inc.	Medium	Rare	Fair	Good	Infill +		2	52
Norway spruce	Picea abies	NSH	FIA	0.6	1.4	1.6	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	53
rock elm	Ulmus thomasii	NSLX	FIA	2.4	1.2	0.5	Unknown	Unknown	Low	Rare	FIA Only	FIA Only			0	54
balsam poplar	Populus balsamifera	NSH	Medium	0.6	0.4	0.4	Very Lg. dec.	Very Lg. dec.	Medium	Rare	Lost	Lost			0	55
mountain maple	Acer spicatum	NSL	Low	0.9	0.3	0.1	No change	Lg. dec.	High	Rare	Fair	Poor			0	56
peachleaf willow	Salix amygdaloides	NSLX	FIA	0.4	0.1	0.2	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	57
cittamwood/gum bumelia	Sideroxylon lanuginosum ssp.	NSL	Low	0	0	0	Unknown	New Habitat	High	Absent	Unknown	New Habitat			0	58
pignut hickory	Carya glabra	WDL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	59
black hickory	Carya texana	NDL	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			0	60
mockernut hickory	Carya alba	WDL	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat		Migrate +	3	61
sugarberry	Celtis laevigata	NDH	Medium	0	0	0	Unknown	New Habitat	Medium	Absent	Unknown	New Habitat			0	62
eastern redbud	Cercis canadensis	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	63
American beech	Fagus grandifolia	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	64
honeylocust	Gleditsia triacanthos	NSH	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	65
yellow-poplar	Liriodendron tulipifera	WDH	High	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			3	66
Osage-orange	Maclura pomifera	NDH	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	67
bigleaf magnolia	Magnolia macrophylla	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	68
blackgum	Nyssa sylvatica	WDL	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			3	69
sycamore	Platanus occidentalis	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	70
scarlet oak	Quercus coccinea	WDL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	71
shingle oak	Quercus imbricaria	NDH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +	3	72
blackjack oak	Quercus marilandica	NSL	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			3	73
chinkapin oak	Quercus muehlenbergii	NSL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	74
post oak	Quercus stellata	WDH	High	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			3	75
sassafras	Sassafras albidum	WSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	76
American mountain-ash	Sorbus americana	NSL	Low	0	0	0	Unknown	Unknown	Low	Absent	Unknown	Unknown			0	77