

Current and Potential Future Habitat, Capability, and Migration

	sq. km	sq. mi	FIA Plots
Area of Region	6,900.4	2,664.3	169

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		
		High	Low	Reliability	Adaptability	Scenario RCP45	Scenario RCP85	Scenario RCP45	Scenario RCP85	SHIFT RCP45	SHIFT RCP85	
Ash	3											
Hickory	4											
Maple	5	Abundant	5	High	23	18	Increase	16	18	Very Good	9	9
Oak	8	Common	21	Medium	26	45	No Change	12	14	Good	8	12
Pine	4	Rare	27	Low	25	13	Decrease	19	15	Fair	8	6
Other	29	Absent	23	FIA	6		New	19	19	Poor	11	9
	53		76		80	76	Unknown	14	14	Very Poor	9	9
								80	80	FIA Only	2	2
										Unknown	8	8
											14	18

Potential Changes in Climate Variables

Temperature (°F)

Scenario	2009	2039	2069	2099	
Annual CCSM45	49.8	51.6	53.6	53.9	
Average CCSM85	49.8	52.0	54.4	57.3	
GFDL45	49.8	53.0	55.3	56.4	
GFDL85	49.8	52.8	56.5	60.6	
HAD45	49.8	52.1	55.5	57.2	
HAD85	49.8	52.0	56.3	61.0	
Growing Season CCSM45	66.0	68.0	69.6	70.0	
Season CCSM85	66.0	68.1	70.5	73.9	
May—Sep GFDL45	66.0	69.4	72.1	73.3	
GFDL85	66.0	69.3	73.4	77.6	
HAD45	66.0	68.4	71.5	73.6	
HAD85	66.0	67.6	72.4	77.3	
Coldest Month CCSM45	25.2	26.7	28.3	29.0	
Month CCSM85	25.2	27.6	28.7	30.7	
Average GFDL45	25.2	28.8	30.0	31.0	
GFDL85	25.2	28.7	30.3	32.5	
HAD45	25.2	26.6	29.1	29.5	
HAD85	25.2	27.7	29.8	32.6	
Warmest Month CCSM45	72.3	74.5	75.4	75.4	
Month CCSM85	72.3	74.7	76.2	77.8	
Average GFDL45	72.3	75.1	76.7	77.8	
GFDL85	72.3	75.9	78.3	80.8	
HAD45	72.3	74.9	76.4	77.4	
HAD85	72.3	74.0	76.4	79.6	

Precipitation (in)

Scenario	2009	2039	2069	2099	
Annual CCSM45	50.6	50.5	49.9	55.3	
Total CCSM85	50.6	51.6	54.0	57.3	
GFDL45	50.6	55.0	58.3	56.2	
GFDL85	50.6	53.8	57.1	60.0	
HAD45	50.6	51.2	55.0	54.6	
HAD85	50.6	54.9	55.1	57.3	
Growing Season CCSM45	20.9	23.1	21.8	23.6	
Season CCSM85	20.9	22.1	23.3	23.0	
May—Sep GFDL45	20.9	21.0	20.7	21.5	
GFDL85	20.9	21.5	21.0	21.7	
HAD45	20.9	21.1	21.0	20.9	
HAD85	20.9	21.5	21.2	21.9	

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-DGP30 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	ChngC145	ChngC185	Adap	Abund	Capabil45	Capabil85	SHIFT45	SHIFT85	SSO	N
red maple	Acer rubrum	WDH	High	95	2525.4	20.1	Sm. dec.	Sm. dec.	High	Abundant	Good	Good			1	1
sweet birch	Betula lenta	NDH	High	73.9	906.4	8.7	Sm. dec.	Sm. dec.	Low	Abundant	Fair	Fair			0	2
white oak	Quercus alba	WDH	Medium	74.6	821.6	8.1	No change	No change	High	Abundant	Very Good	Very Good			1	3
northern red oak	Quercus rubra	WDH	Medium	76.3	799.4	7.6	No change	No change	High	Abundant	Very Good	Very Good			1	4
black oak	Quercus velutina	WDH	High	71.3	710.8	7.7	Sm. inc.	Sm. inc.	Medium	Abundant	Very Good	Very Good			1	5
eastern white pine	Pinus strobus	WDH	High	44.3	487.6	7.7	Sm. dec.	Lg. dec.	Low	Common	Poor	Very Poor			0	6
eastern hemlock	Tsuga canadensis	NSH	High	35.5	476.2	8.4	Sm. dec.	Lg. dec.	Low	Common	Poor	Very Poor			0	7
scarlet oak	Quercus coccinea	WDL	Medium	51.9	390.4	4.5	Sm. inc.	No change	Medium	Common	Good	Fair			1	8
eastern redcedar	Juniperus virginiana	WDH	Medium	26.8	380.8	10.8	No change	Sm. inc.	Medium	Common	Fair	Good			1	9
sugar maple	Acer saccharum	WDH	High	45	345.0	6.2	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good			1	10
white ash	Fraxinus americana	WDL	Medium	48.2	316.3	4.9	Sm. inc.	Sm. inc.	Low	Common	Fair	Fair			1	11
American beech	Fagus grandifolia	WDH	High	49.8	246.2	3.9	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	12
black cherry	Prunus serotina	WDL	Medium	45.3	213.1	3.0	Lg. inc.	Lg. inc.	Low	Common	Good	Good			1	13
pignut hickory	Carya glabra	WDL	Medium	41.3	206.3	3.3	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	14
yellow birch	Betula alleghaniensis	NDL	High	41.7	176.6	2.9	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	15
chestnut oak	Quercus prinus	NDH	High	18.7	123.2	4.2	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	16
American elm	Ulmus americana	WDH	Medium	21.6	115.4	5.4	Sm. dec.	No change	Medium	Common	Poor	Fair			1	17
shagbark hickory	Carya ovata	WSL	Medium	36.3	94.9	2.7	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	18
yellow-poplar	Liriodendron tulipifera	WDH	High	20.1	90.0	4.7	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	19
black locust	Robinia pseudoacacia	NDH	Low	4.4	79.2	10.3	No change	No change	Medium	Common	Fair	Fair	Infill +	Infill +	1	20
silver maple	Acer saccharinum	NSH	Low	7.8	77.2	11.5	Sm. dec.	No change	High	Common	Fair	Good		Infill ++	1	21
mockernut hickory	Carya alba	WDL	Medium	21.6	72.7	2.6	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	22
paper birch	Betula papyrifera	WDL	High	10.6	70.5	3.3	Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor	Infill +	Infill +	0	23
blackgum	Nyssa sylvatica	WDL	Medium	21.8	69.6	2.2	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	24
sassafras	Sassafras albidum	WSL	Low	33.2	64.2	1.5	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	25
bigtooth aspen	Populus grandidentata	NSL	Medium	21	58.5	2.7	Sm. dec.	Lg. dec.	Medium	Common	Poor	Poor			0	26
pitch pine	Pinus rigida	NSH	High	6.8	47.9	2.8	No change	No change	Medium	Rare	Poor	Poor			1	27
bitternut hickory	Carya cordiformis	WSL	Low	7.2	41.5	5.7	No change	No change	High	Rare	Fair	Fair	Infill +	Infill +	1	28
Norway spruce	Picea abies	NSH	FIA	4.4	40.2	9.2	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	29
eastern cottonwood	Populus deltoides	NSH	Low	5.6	34.9	6.0	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	30
gray birch	Betula populifolia	NSL	Low	11.4	32.6	1.4	Sm. dec.	No change	Medium	Rare	Very Poor	Poor			1	31
American hornbeam; muscley	Carpinus caroliniana	WSL	Low	15.3	26.5	1.3	No change	Lg. inc.	Medium	Rare	Poor	Good			1	32
Norway maple	Acer platanoides	NSL	FIA	8.9	26.3	4.4	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	33
quaking aspen	Populus tremuloides	WDH	High	7	25.6	2.5	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	34
black walnut	Juglans nigra	WDH	Low	2.6	23.0	6.6	Sm. dec.	No change	Medium	Rare	Very Poor	Poor		Infill +	2	35
eastern hophornbeam; ironw	Ostrya virginiana	WDL	Low	16.4	22.4	1.1	No change	Lg. inc.	High	Rare	Fair	Good			1	36
red pine	Pinus resinosa	NSH	Medium	7.3	19.1	7.4	Very Lg. dec.	Very Lg. dec.	Low	Rare	Lost	Lost			0	37
sycamore	Platanus occidentalis	NSL	Low	1.5	19.1	13.2	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	38
green ash	Fraxinus pennsylvanica	WSH	Low	3.9	15.8	5.5	Sm. inc.	Lg. inc.	Medium	Rare	Fair	Good	Infill +	Infill ++	2	39
swamp white oak	Quercus bicolor	NSL	Low	3.8	15.1	6.0	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	40
American basswood	Tilia americana	WDL	Medium	7.8	13.9	1.8	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	1	41
American chestnut	Castanea dentata	NSLX	FIA	14	13.9	1.3	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	42
bear oak; scrub oak	Quercus ilicifolia	NSLX	FIA	0.1	5.9	0.4	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	43
black ash	Fraxinus nigra	WSH	Medium	1.5	5.6	3.8	Sm. dec.	Sm. dec.	Low	Rare	Very Poor	Very Poor			0	44
flowering dogwood	Cornus florida	WDL	Medium	5.7	4.7	0.4	No change	No change	Medium	Rare	Poor	Poor		Infill +	1	45
serviceberry	Amelanchier spp.	NSL	Low	5	4.2	0.6	Lg. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	46
Scots pine	Pinus sylvestris	NSH	FIA	1.5	3.9	2.7	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	47

One x One Degree
Climate Change Atlas Tree Species

USDA Forest Service
Northern Research Station
Landscape Change Research Group
Iverson, Peters, Prasad, Matthews

Current and Potential Future Habitat, Capability, and Migration

Common Name	Scientific Name	Range	MR	%Cell	FIAsum	FAIiv	ChngCl45	ChngCl85	Adap	Abund	Capabil45	Capabil85	SHIFT45	SHIFT85	SSO	N
red spruce	<i>Picea rubens</i>	NDH	High	3.2	3.1	0.8	Sm. dec.	Sm. dec.	Low	Rare	Very Poor	Very Poor			0	48
slippery elm	<i>Ulmus rubra</i>	WSL	Low	2.9	2.7	0.9	Very Lg. dec.	Very Lg. dec.	Medium	Rare	Lost	Lost			0	49
striped maple	<i>Acer pensylvanicum</i>	NSL	Medium	1.9	2.0	0.2	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	50
ailanthus	<i>Ailanthus altissima</i>	NSL	FIA	1.5	0.6	0.4	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	51
post oak	<i>Quercus stellata</i>	WDH	High	0.1	0.5	0.0	Lg. inc.	Lg. inc.	High	Rare	Good	Good			2	52
tamarack (native)	<i>Larix laricina</i>	NSH	High	2.4	0.4	0.4	Sm. dec.	Sm. dec.	Low	Rare	Very Poor	Very Poor			0	53
shortleaf pine	<i>Pinus echinata</i>	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate ++	3	54
loblolly pine	<i>Pinus taeda</i>	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate ++	Migrate ++	3	55
Virginia pine	<i>Pinus virginiana</i>	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	56
bald cypress	<i>Taxodium distichum</i>	NSH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	57
florida maple	<i>Acer barbatum</i>	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			0	58
cittamwood/gum bumelia	<i>Sideroxylon lanuginosum</i> ssp.	NSL	Low	0	0	0	Unknown	Unknown	High	Absent	Unknown	Unknown			0	59
black hickory	<i>Carya texana</i>	NDL	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			0	60
sugarberry	<i>Celtis laevigata</i>	NDH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			0	61
eastern redbud	<i>Cercis canadensis</i>	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +	3	62
American holly	<i>Ilex opaca</i>	NSL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	63
sweetgum	<i>Liquidambar styraciflua</i>	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate ++	Migrate ++	3	64
cucumbertree	<i>Magnolia acuminata</i>	NSL	Low	0	0	0	Unknown	Unknown	Medium	Modeled	Unknown	Unknown			0	65
mountain or Fraser magnolia	<i>Magnolia fraseri</i>	NSL	Low	0	0	0	Unknown	Unknown	Low	Absent	Unknown	Unknown			0	66
swamp tupelo	<i>Nyssa biflora</i>	NDH	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat			3	67
sourwood	<i>Oxydendrum arboreum</i>	NDL	High	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			3	68
redbay	<i>Persea borbonia</i>	NSL	Low	0	0	0	Unknown	Unknown	High	Absent	Unknown	Unknown			0	69
pin cherry	<i>Prunus pensylvanica</i>	NSL	Low	0	0	0	Unknown	Unknown	Medium	Modeled	Unknown	Unknown			0	70
southern red oak	<i>Quercus falcata</i>	WDL	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	71
cherrybark oak; swamp red o.	<i>Quercus pagoda</i>	NSL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	72
blackjack oak	<i>Quercus marilandica</i>	NSL	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			3	73
chinkapin oak	<i>Quercus muehlenbergii</i>	NSL	Medium	0	0	0	Unknown	Unknown	Medium	Modeled	Unknown	Unknown			0	74
water oak	<i>Quercus nigra</i>	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	75
pin oak	<i>Quercus palustris</i>	NSH	Low	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat	Migrate +		3	76
willow oak	<i>Quercus phellos</i>	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +	3	77
bluejack oak	<i>Quercus incana</i>	NSL	Low	0	0	0	Unknown	Unknown	Medium	Modeled	Unknown	Unknown			0	78
American mountain-ash	<i>Sorbus americana</i>	NSL	Low	0	0	0	Unknown	Unknown	Low	Absent	Unknown	Unknown			0	79
winged elm	<i>Ulmus alata</i>	WDL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	80

