

One x One Degree
Climate Change Atlas Tree Species
 Current and Potential Future Habitat, Capability, and Migration

	sq. km	sq. mi	FIA Plots
Area of Region	6,258.1	2,416.3	199

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	3			High	16	18	Increase	12	11	Very Good	3	3
Hickory	0			Medium	23	31	No Change	7	8	Good	10	11
Maple	5	Abundant	9	Low	20	12	Decrease	15	15	Fair	12	9
Oak	4	Common	17	FIA	4		New	22	22	Poor	5	6
Pine	4	Rare	12				Unknown	7	7	Very Poor	3	2
Other	22	Absent	24							FIA Only	2	2
	38		62		63	61		63	63	Unknown	3	3
											13	20

Potential Changes in Climate Variables

Temperature (°F)

	Scenario	2009	2039	2069	2099	
Annual Average	CCSM45	43.6	45.3	48.4	48.3	
	CCSM85	43.6	46.1	49.2	52.7	
	GFDL45	43.6	46.7	49.7	51.2	
	GFDL85	43.6	47.1	51.0	56.2	
	HAD45	43.6	47.0	50.2	52.2	
HAD85	43.6	47.3	51.4	57.4		
Growing Season (May—Sep)	CCSM45	61.4	62.9	65.2	65.4	
	CCSM85	61.4	63.5	66.3	70.0	
	GFDL45	61.4	65.6	69.5	71.6	
	GFDL85	61.4	66.3	71.1	76.9	
	HAD45	61.4	64.7	66.9	69.3	
HAD85	61.4	64.5	68.3	74.2		
Coldest Month Average	CCSM45	16.3	18.0	21.0	20.4	
	CCSM85	16.3	19.1	21.3	24.0	
	GFDL45	16.3	17.8	20.0	20.6	
	GFDL85	16.3	18.9	20.7	23.5	
	HAD45	16.3	18.1	22.1	22.4	
HAD85	16.3	20.6	23.2	28.3		
Warmest Month Average	CCSM45	67.7	69.5	71.0	71.4	
	CCSM85	67.7	70.4	72.1	74.1	
	GFDL45	67.7	72.2	74.0	75.4	
	GFDL85	67.7	72.8	75.3	78.2	
	HAD45	67.7	71.1	72.0	73.8	
HAD85	67.7	71.4	73.5	77.6		

Precipitation (in)

	Scenario	2009	2039	2069	2099	
Annual Total	CCSM45	31.0	31.2	30.9	31.7	
	CCSM85	31.0	31.9	30.9	32.4	
	GFDL45	31.0	33.0	35.2	34.6	
	GFDL85	31.0	33.2	35.7	36.2	
	HAD45	31.0	32.5	34.1	33.4	
HAD85	31.0	33.4	33.8	36.3		
Growing Season (May—Sep)	CCSM45	15.3	15.8	15.2	15.6	
	CCSM85	15.3	15.6	14.5	14.4	
	GFDL45	15.3	15.6	16.8	16.3	
	GFDL85	15.3	16.3	16.0	15.5	
	HAD45	15.3	15.3	14.4	14.5	
HAD85	15.3	15.6	13.4	14.3		

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	ChngCl45	ChngCl85	Adap	Abund	Capabil45	Capabil85	SHIFT45	SHIFT85	SSO	N
sugar maple	Acer saccharum	WDH	High	58	2034.7	18.5	Sm. dec.	Sm. dec.	High	Abundant	Good	Good			1	1
northern white-cedar	Thuja occidentalis	WDH	High	48.2	1338.2	13.4	Sm. dec.	Sm. dec.	Medium	Abundant	Fair	Fair			0	2
quaking aspen	Populus tremuloides	WDH	High	68.2	1016.6	8.9	No change	No change	Medium	Abundant	Good	Good			1	3
red maple	Acer rubrum	WDH	High	80.7	1003.1	7.7	Sm. inc.	No change	High	Abundant	Very Good	Very Good			1	4
eastern white pine	Pinus strobus	WDH	High	56	923.3	11.9	Sm. dec.	Lg. dec.	Low	Abundant	Fair	Poor			0	5
balsam fir	Abies balsamea	NDH	High	63.2	810.6	7.1	Lg. dec.	Lg. dec.	Low	Abundant	Poor	Poor			0	6
red pine	Pinus resinosa	NSH	Medium	38.9	789.3	12.1	No change	No change	Low	Abundant	Fair	Fair			0	7
bigtooth aspen	Populus grandidentata	NSL	Medium	63.6	751.7	8.6	Sm. dec.	Sm. dec.	Medium	Abundant	Fair	Fair			0	8
northern red oak	Quercus rubra	WDH	Medium	35.4	685.4	8.5	No change	No change	High	Abundant	Very Good	Very Good			1	9
jack pine	Pinus banksiana	NSH	Medium	20.2	412.3	12.6	Sm. dec.	Sm. dec.	High	Common	Fair	Fair			1	10
American basswood	Tilia americana	WSL	Medium	33.9	397.4	7.8	No change	No change	Medium	Common	Fair	Fair			1	11
paper birch	Betula papyrifera	WDH	High	54.1	345.2	3.3	No change	No change	Medium	Common	Fair	Fair			1	12
American beech	Fagus grandifolia	WDH	High	41.6	295.7	3.4	No change	Sm. inc.	Medium	Common	Fair	Good			1	13
balsam poplar	Populus balsamifera	NSH	Medium	34.5	235.5	3.4	Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor			0	14
white spruce	Picea glauca	NSL	Medium	38.5	202.1	2.8	Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor			0	15
black ash	Fraxinus nigra	WSH	Medium	36.4	161.6	2.8	Sm. inc.	Sm. inc.	Low	Common	Fair	Fair			1	16
eastern hophornbeam; ironw	Ostrya virginiana	WSL	Low	39	150.9	2.5	Sm. dec.	Lg. dec.	High	Common	Fair	Fair			1	17
tamarack (native)	Larix laricina	NSH	High	18.6	136.1	3.4	Sm. inc.	Sm. inc.	Low	Common	Fair	Fair			1	18
eastern hemlock	Tsuga canadensis	NSH	High	21.1	119.1	2.3	Sm. inc.	No change	Low	Common	Fair	Poor			1	19
black cherry	Prunus serotina	WDL	Medium	27.8	112.2	2.4	Lg. inc.	Lg. inc.	Low	Common	Good	Good			1	20
northern pin oak	Quercus ellipsoidalis	NSH	Medium	7.2	104.9	12.2	No change	No change	High	Common	Good	Good	Infill ++	Infill ++	1	21
white ash	Fraxinus americana	WDL	Medium	33.1	103.6	1.7	Lg. inc.	Lg. inc.	Low	Common	Good	Good			1	22
black spruce	Picea mariana	NSH	High	25.1	84.1	2.1	Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor			0	23
green ash	Fraxinus pennsylvanica	WSH	Low	11	80.6	2.3	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	24
yellow birch	Betula alleghaniensis	NDL	High	21.9	53.5	1.4	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	25
Scots pine	Pinus sylvestris	NSH	FIA	2	52.6	10.6	Unknown	Unknown	NA	Common	NNIS	NNIS			0	26
American elm	Ulmus americana	WDH	Medium	24.6	45.3	1.2	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			1	27
pin cherry	Prunus pensylvanica	NSL	Low	8.5	43.8	3.0	Very Lg. dec.	Very Lg. dec.	Medium	Rare	Lost	Lost			0	28
white oak	Quercus alba	WDH	Medium	6.6	38.8	4.3	Lg. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	Infill ++	1	29
black oak	Quercus velutina	WDH	High	4.8	25.2	5.3	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	1	30
silver maple	Acer saccharinum	NSH	Low	3.2	21.5	6.7	Lg. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	Infill ++	1	31
serviceberry	Amelanchier spp.	NSL	Low	18.6	20.9	0.9	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	32
Norway spruce	Picea abies	NSH	FIA	1.6	20.8	13.0	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	33
chokecherry	Prunus virginiana	NSLX	FIA	4.1	9.5	1.6	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	34
slippery elm	Ulmus rubra	WSL	Low	5	7.8	0.7	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	35
striped maple	Acer pensylvanicum	NSL	Medium	5.1	4.5	0.3	Lg. dec.	Very Lg. dec.	Medium	Rare	Very Poor	Lost			0	36
mountain maple	Acer spicatum	NSL	Low	1.1	0.9	0.1	Sm. dec.	Very Lg. dec.	High	Rare	Poor	Lost			0	37
peachleaf willow	Salix amygdaloides	NSLX	FIA	1.6	0.6	0.4	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	38
eastern redcedar	Juniperus virginiana	WDH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate ++	3	39
boxelder	Acer negundo	WSH	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	40
sweet birch	Betula lenta	NDH	High	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat			3	41
bitternut hickory	Carya cordiformis	WSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat		Migrate +	3	42
pignut hickory	Carya glabra	WDL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	43
shagbark hickory	Carya ovata	WSL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	44
mockernut hickory	Carya alba	WDL	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			3	45
hackberry	Celtis occidentalis	WDH	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat		Migrate +	3	46
flowering dogwood	Cornus florida	WDL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +	3	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	FIAiv	ChngCl45	ChngCl85	Adap	Abund	Capabil45	Capabil85	SHIFT45	SHIFT85	SSO	N
black walnut	Juglans nigra	WDH	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	48
yellow-poplar	Liriodendron tulipifera	WDH	High	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat		Migrate +	3	49
Osage-orange	Maclura pomifera	NDH	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			3	50
cucumbertree	Magnolia acuminata	NSL	Low	0	0	0	Unknown	Unknown	Medium	Modeled	Unknown	Unknown			0	51
bigleaf magnolia	Magnolia macrophylla	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	52
blackgum	Nyssa sylvatica	WDL	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat		Migrate +	3	53
sycamore	Platanus occidentalis	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	54
eastern cottonwood	Populus deltoides	NSH	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate ++	3	55
swamp white oak	Quercus bicolor	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	56
bur oak	Quercus macrocarpa	NDH	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat		Migrate +	3	57
pin oak	Quercus palustris	NSH	Low	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat			3	58
post oak	Quercus stellata	WDH	High	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			0	59
black locust	Robinia pseudoacacia	NDH	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Likely +	Likely +	3	60
black willow	Salix nigra	NSH	Low	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	61
sassafras	Sassafras albidum	WSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	62
American mountain-ash	Sorbus americana	NSL	Low	0	0	0	Unknown	Unknown	Low	Absent	Unknown	Unknown			0	63