

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

Area of Region sq. km sq. mi FIA Plots
 8,985.5 3,469.3 125

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	20	RCP45	RCP85	RCP45	RCP85	RCP45	RCP85				
Ash	3					Increase	17	17	Very Good	8	7	Likely	0	0	
Hickory	2			Medium	21	33	No Change	10	7	Good	11	13	Infill	30	26
Maple	4	Abundant	3	Low	24	9	Decrease	14	17	Fair	5	2	Migrate	11	12
Oak	6	Common	22	FIA	6		New	16	18	Poor	9	9		41	38
Pine	2	Rare	22				Unknown	8	6	Very Poor	6	7			
Other	30	Absent	18							FIA Only	3	3			
	47		65		65	62		65	65	Unknown	2	0			
											44	41			

Potential Changes in Climate Variables

Temperature (°F)

	Scenario	2009	2039	2069	2099	
Annual Average	CCSM45	46.1	48.1	51.0	51.0	
	CCSM85	46.1	48.8	51.6	54.9	
	GFDL45	46.1	50.8	51.7	53.0	
	GFDL85	46.1	49.4	52.9	57.6	
	HAD45	46.1	49.1	52.6	54.3	
	HAD85	46.1	49.5	53.9	59.2	
Growing Season (May—Sep)	CCSM45	64.9	66.9	69.3	69.6	
	CCSM85	64.9	67.7	70.1	74.0	
	GFDL45	64.9	70.7	71.6	73.5	
	GFDL85	64.9	68.9	73.0	78.4	
	HAD45	64.9	68.0	70.2	72.4	
	HAD85	64.9	67.7	72.0	77.1	
Coldest Month (Average)	CCSM45	16.4	18.1	21.0	21.0	
	CCSM85	16.4	19.1	21.4	23.5	
	GFDL45	16.4	19.7	21.3	21.6	
	GFDL85	16.4	20.4	21.8	24.1	
	HAD45	16.4	17.7	21.8	22.0	
	HAD85	16.4	20.6	24.2	27.8	
Warmest Month (Average)	CCSM45	71.0	73.5	74.9	75.4	
	CCSM85	71.0	74.6	76.3	78.3	
	GFDL45	71.0	74.4	76.0	77.4	
	GFDL85	71.0	75.4	77.5	80.7	
	HAD45	71.0	74.2	75.4	76.9	
	HAD85	71.0	74.9	77.3	80.9	

Precipitation (in)

	Scenario	2009	2039	2069	2099	
Annual Total	CCSM45	32.8	32.4	32.4	33.0	
	CCSM85	32.8	33.2	33.8	33.6	
	GFDL45	32.8	35.0	39.0	37.5	
	GFDL85	32.8	36.5	39.6	39.5	
	HAD45	32.8	33.4	34.8	34.7	
	HAD85	32.8	34.7	33.3	35.8	
Growing Season (May—Sep)	CCSM45	18.8	18.6	18.3	19.1	
	CCSM85	18.8	18.8	19.2	18.1	
	GFDL45	18.8	19.2	22.0	20.7	
	GFDL85	18.8	20.8	21.2	20.5	
	HAD45	18.8	18.5	17.3	17.8	
	HAD85	18.8	18.8	15.7	16.4	

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
green ash	Fraxinus pennsylvanica	WSH	Low	55.3	730.1	16.4	No change	No change	Medium	Abundant	Good	Good	Infill ++	Infill ++	1	1
American elm	Ulmus americana	WDH	Medium	64.7	537.1	9.7	No change	No change	Medium	Abundant	Good	Good	Infill ++	Infill ++	1	2
boxelder	Acer negundo	WSH	Low	48.5	511.9	14.1	Sm. dec.	Sm. dec.	High	Abundant	Good	Good	Infill ++	Infill ++	1	3
American basswood	Tilia americana	WSL	Medium	49.4	381.8	10.3	Sm. dec.	Lg. dec.	Medium	Common	Poor	Poor	Infill +	Infill +	0	4
sugar maple	Acer saccharum	WDH	High	24.5	369.9	13.1	No change	No change	High	Common	Good	Good	Infill ++	Infill ++	1	5
black cherry	Prunus serotina	WDL	Medium	50.2	342.3	10.1	Sm. inc.	No change	Low	Common	Fair	Poor	Infill +	Infill +	1	6
black willow	Salix nigra	NSH	Low	18.9	227.0	27.9	Sm. dec.	Sm. dec.	Low	Common	Poor	Poor	Infill +	Infill +	0	7
red pine	Pinus resinosa	NSH	Medium	14.5	218.8	19.3	Lg. dec.	Lg. dec.	Low	Common	Very Poor	Very Poor			0	8
eastern white pine	Pinus strobus	WDH	High	21.8	208.5	13.4	No change	Lg. dec.	Low	Common	Poor	Very Poor	Infill +		0	9
northern red oak	Quercus rubra	WDH	Medium	30.2	197.7	8.3	No change	No change	High	Common	Good	Good	Infill ++	Infill ++	1	10
white ash	Fraxinus americana	WDL	Medium	27.4	178.2	7.3	Sm. inc.	Sm. inc.	Low	Common	Fair	Fair	Infill +	Infill +	1	11
tamarack (native)	Larix laricina	NSH	High	9.5	127.4	8.7	Sm. dec.	Sm. dec.	Low	Common	Poor	Poor	Infill +	Infill +	2	12
black ash	Fraxinus nigra	WSH	Medium	26	125.4	5.8	Lg. dec.	Lg. dec.	Low	Common	Very Poor	Very Poor			0	13
northern white-cedar	Thuja occidentalis	WSH	High	5.6	112.2	14.2	Sm. dec.	Sm. dec.	Medium	Common	Poor	Poor	Infill +		2	14
bitternut hickory	Carya cordiformis	WDL	Low	19.8	108.6	7.6	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good	Infill ++	Infill ++	1	15
black walnut	Juglans nigra	WSL	Low	13	107.9	14.0	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good	Infill ++	Infill ++	2	16
quaking aspen	Populus tremuloides	WDH	High	18.3	105.6	7.5	Sm. inc.	Sm. inc.	Medium	Common	Good	Good	Infill ++	Infill ++	1	17
shagbark hickory	Carya ovata	WSL	Medium	29.8	100.8	4.2	Lg. inc.	Sm. inc.	Medium	Common	Very Good	Good	Infill ++	Infill ++	1	18
bur oak	Quercus macrocarpa	NDH	Medium	33.6	100.7	7.5	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good	Infill ++	Infill ++	1	19
white oak	Quercus alba	WDH	Medium	20.2	90.5	5.9	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good	Infill ++	Infill ++	2	20
silver maple	Acer saccharinum	NSH	Low	11.9	75.4	13.0	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good	Infill ++	Infill ++	1	21
red maple	Acer rubrum	WDH	High	16	72.8	4.3	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good	Infill ++	Infill ++	1	22
eastern hophornbeam; ironw	Ostrya virginiana	WSL	Low	22.6	71.3	3.0	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good	Infill ++	Infill ++	1	23
eastern cottonwood	Populus deltoides	NSH	Low	7.5	58.0	10.2	No change	Sm. inc.	Medium	Common	Fair	Good	Infill +	Infill ++	2	24
bigtooth aspen	Populus grandidentata	NSL	Medium	5.3	52.6	8.8	Sm. dec.	Sm. dec.	Medium	Common	Poor	Poor	Infill +		2	25
black locust	Robinia pseudoacacia	NDH	Low	3.4	46.6	20.5	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	26
American beech	Fagus grandifolia	WDH	High	3.3	40.1	5.0	No change	Sm. dec.	Medium	Rare	Poor	Very Poor	Infill +		2	27
slippery elm	Ulmus rubra	WSL	Low	25	36.3	3.3	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	1	28
Siberian elm	Ulmus pumila	NDH	FIA	0.5	35.0	13.8	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	29
paper birch	Betula papyrifera	WDH	High	4.8	33.4	3.6	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			2	30
black oak	Quercus velutina	WDH	High	2.2	23.4	10.5	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	2	31
hackberry	Celtis occidentalis	WDH	Medium	2.9	22.9	6.8	Lg. inc.	Lg. inc.	High	Rare	Good	Good			2	32
northern pin oak	Quercus ellipsoidalis	NSH	Medium	9.2	22.1	3.4	No change	Sm. dec.	High	Rare	Fair	Poor	Infill +	Infill +	2	33
white spruce	Picea glauca	NSL	Medium	5.8	14.8	2.2	Lg. dec.	Very Lg. dec.	Medium	Rare	Very Poor	Lost			0	34
pin cherry	Prunus pensylvanica	NSL	Low	6.2	14.2	4.2	Very Lg. dec.	Very Lg. dec.	Medium	Rare	Lost	Lost			0	35
Norway spruce	Picea abies	NSH	FIA	4.7	13.9	5.0	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	36
white mulberry	Morus alba	NSL	FIA	1.1	12.9	11.6	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	37
yellow birch	Betula alleghaniensis	NDL	High	2.2	10.0	4.5	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	38
eastern redcedar	Juniperus virginiana	WDH	Medium	3.3	7.4	2.2	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	39
swamp white oak	Quercus bicolor	NSL	Low	6.4	7.3	8.6	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	40
red mulberry	Morus rubra	NSL	Low	5.6	5.4	8.0	Sm. inc.	Sm. inc.	Medium	Rare	Fair	Fair	Infill +	Infill +	2	41
chokecherry	Prunus virginiana	NSLX	FIA	7.8	3.6	0.9	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	42
black spruce	Picea mariana	NSH	High	0.8	3.4	2.1	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	43
serviceberry	Amelanchier spp.	NSL	Low	1.1	2.7	2.4	Very Lg. dec.	Very Lg. dec.	Medium	Rare	Lost	Lost			0	44
butternut	Juglans cinerea	NSLX	FIA	1.1	2.4	2.1	Unknown	Unknown	Low	Rare	FIA Only	FIA Only			0	45
American hornbeam; musclev	Carpinus caroliniana	WSL	Low	4.4	1.0	0.9	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	46
wild plum	Prunus americana	NSLX	FIA	1.1	0.9	0.8	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			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	FIAiv	ChngCl45	ChngCl85	Adap	Abund	Capabil45	Capabil85	SHIFT45	SHIFT85	SSO	N
Ohio buckeye	<i>Aesculus glabra</i>	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +		3	48
cittamwood/gum bumelia	<i>Sideroxylon lanuginosum ssp.</i>	NSL	Low	0	0	0	Unknown	New Habitat	High	Absent	Unknown	New Habitat			0	49
pignut hickory	<i>Carya glabra</i>	WDL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	50
black hickory	<i>Carya texana</i>	NDL	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	51
mockernut hickory	<i>Carya alba</i>	WDL	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	52
eastern redbud	<i>Cercis canadensis</i>	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	53
common persimmon	<i>Diospyros virginiana</i>	NSL	Low	0	0	0	Unknown	New Habitat	High	Absent	Unknown	New Habitat			3	54
honeylocust	<i>Gleditsia triacanthos</i>	NSH	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	55
yellow-poplar	<i>Liriodendron tulipifera</i>	WDH	High	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat		Migrate +	3	56
Osage-orange	<i>Maclura pomifera</i>	NDH	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	57
sycamore	<i>Platanus occidentalis</i>	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	58
shingle oak	<i>Quercus imbricaria</i>	NDH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +	3	59
blackjack oak	<i>Quercus marilandica</i>	NSL	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			3	60
chinkapin oak	<i>Quercus muehlenbergii</i>	NSL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	61
pin oak	<i>Quercus palustris</i>	NSH	Low	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	62
Shumard oak	<i>Quercus shumardii</i>	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			3	63
post oak	<i>Quercus stellata</i>	WDH	High	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +	Migrate ++	3	64
sassafras	<i>Sassafras albidum</i>	WSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	65