

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
 8,837.4 3,412.1 402

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	20	Increase	20	22	Very Good	9	8	Likely	3	3
Hickory	2			Medium	24	No Change	6	3	Good	11	14	Infill	8	8
Maple	4	Abundant	5	Low	21	Decrease	17	18	Fair	10	7	Migrate	3	10
Oak	6	Common	26	FIA	7	New	20	21	Poor	6	8			
Pine	4	Rare	19			Unknown	9	8	Very Poor	4	3			
Other	31	Absent	22						FIA Only	3	3			
	50		72		72		72	72	Unknown	2	1		14	21
										45	44			

Potential Changes in Climate Variables

Temperature (°F)

	Scenario	2009	2039	2069	2099	
Annual Average	CCSM45	44.0	45.9	49.0	49.0	
	CCSM85	44.0	46.7	49.6	53.1	
	GFDL45	44.0	47.1	49.8	51.1	
	GFDL85	44.0	47.4	50.9	55.9	
	HAD45	44.0	47.1	50.6	52.5	
Growing Season (May—Sep)	CCSM45	63.5	65.4	68.1	68.2	
	CCSM85	63.5	66.3	68.9	73.1	
	GFDL45	63.5	67.1	70.3	72.4	
	GFDL85	63.5	67.6	71.7	77.5	
	HAD45	63.5	66.7	69.3	71.5	
Coldest Month Average	CCSM45	13.2	14.8	17.7	17.8	
	CCSM85	13.2	15.5	17.8	20.2	
	GFDL45	13.2	16.4	18.2	18.6	
	GFDL85	13.2	17.3	18.8	21.6	
	HAD45	13.2	14.6	18.8	18.8	
Warmest Month Average	CCSM45	69.7	72.0	73.5	74.0	
	CCSM85	69.7	73.3	75.0	77.4	
	GFDL45	69.7	73.2	74.9	76.4	
	GFDL85	69.7	74.2	76.4	79.8	
	HAD45	69.7	73.0	74.4	76.0	
HAD85	69.7	73.9	76.3	80.2		

Precipitation (in)

	Scenario	2009	2039	2069	2099	
Annual Total	CCSM45	32.0	32.2	31.9	32.4	
	CCSM85	32.0	32.1	32.5	32.8	
	GFDL45	32.0	34.4	36.9	35.4	
	GFDL85	32.0	35.2	37.8	37.1	
	HAD45	32.0	32.6	34.0	34.3	
Growing Season (May—Sep)	CCSM45	19.4	19.2	18.5	19.5	
	CCSM85	19.4	19.3	19.3	18.4	
	GFDL45	19.4	20.2	21.4	20.0	
	GFDL85	19.4	21.0	21.1	19.8	
	HAD45	19.4	18.9	18.2	18.7	
HAD85	19.4	19.1	17.3	17.6		

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>.

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
red maple	Acer rubrum	WDH	High	83.1	1393.0	12.5	No change	Sm. dec.	High	Abundant	Very Good	Good			1	1
red pine	Pinus resinosa	NSH	Medium	61	1287.0	16.7	Sm. dec.	Lg. dec.	Low	Abundant	Fair	Poor			0	2
quaking aspen	Populus tremuloides	WDH	High	69.3	949.8	9.6	Sm. dec.	Sm. dec.	Medium	Abundant	Fair	Fair			0	3
eastern white pine	Pinus strobus	WDH	High	74.1	835.8	9.0	Sm. dec.	Lg. dec.	Low	Abundant	Fair	Poor			0	4
black oak	Quercus velutina	WDH	High	47.4	635.8	11.9	Sm. inc.	Sm. inc.	Medium	Abundant	Very Good	Very Good			1	5
sugar maple	Acer saccharum	WDH	High	34	485.4	8.8	No change	No change	High	Common	Good	Good			1	6
northern pin oak	Quercus ellipsoidalis	NSH	Medium	41.3	458.1	7.9	No change	Sm. dec.	High	Common	Good	Fair			1	7
northern red oak	Quercus rubra	WDH	Medium	59.3	402.6	5.2	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good			1	8
jack pine	Pinus banksiana	NSH	Medium	32.7	390.0	11.7	Sm. dec.	Sm. dec.	High	Common	Fair	Fair			1	9
black cherry	Prunus serotina	WDL	Medium	74.4	308.1	3.2	Lg. inc.	Lg. inc.	Low	Common	Good	Good			1	10
black ash	Fraxinus nigra	WSH	Medium	40	304.3	4.6	Sm. dec.	Sm. dec.	Low	Common	Poor	Poor			0	11
tamarack (native)	Larix laricina	NSH	High	26.5	299.4	7.1	Sm. dec.	Sm. dec.	Low	Common	Poor	Poor			0	12
white oak	Quercus alba	WDH	Medium	48.8	286.0	5.3	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	13
American elm	Ulmus americana	WDH	Medium	58.1	256.2	2.2	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	14
paper birch	Betula papyrifera	WDH	High	44.4	254.4	4.0	No change	No change	Medium	Common	Fair	Fair			1	15
northern white-cedar	Thuja occidentalis	WSH	High	16.7	250.4	9.3	Sm. dec.	Sm. dec.	Medium	Common	Poor	Poor	Infill +	Infill +	0	16
white spruce	Picea glauca	NSL	Medium	17.2	235.5	5.3	Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor			0	17
American basswood	Tilia americana	WSL	Medium	42.6	232.2	3.4	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	18
white ash	Fraxinus americana	WDL	Medium	38.1	218.2	4.0	Sm. inc.	Sm. inc.	Low	Common	Fair	Fair			1	19
green ash	Fraxinus pennsylvanica	WSH	Low	36.7	207.3	3.2	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	20
boxelder	Acer negundo	WSH	Low	23.6	194.0	5.7	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good			1	21
eastern hemlock	Tsuga canadensis	NSH	High	23.9	175.1	4.4	Lg. dec.	Lg. dec.	Low	Common	Very Poor	Very Poor			0	22
bigtooth aspen	Populus grandidentata	NSL	Medium	34	149.5	3.8	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	23
balsam fir	Abies balsamea	NDH	High	26.3	145.9	3.6	Lg. dec.	Lg. dec.	Low	Common	Very Poor	Very Poor			0	24
black spruce	Picea mariana	NSH	High	12.6	143.6	10.5	Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor			0	25
Scots pine	Pinus sylvestris	NSH	FIA	19.4	133.8	6.0	Unknown	Unknown	NA	Common	NNIS	NNIS			0	26
bur oak	Quercus macrocarpa	NDH	Medium	26.7	125.7	3.1	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good	Infill ++	Infill ++	1	27
silver maple	Acer saccharinum	NSH	Low	11.5	122.2	5.5	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	28
yellow birch	Betula alleghaniensis	NDL	High	29.5	114.7	2.3	Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor			0	29
bitternut hickory	Carya cordiformis	WSL	Low	14.6	98.9	4.0	Sm. dec.	No change	High	Common	Fair	Good			1	30
black locust	Robinia pseudoacacia	NDH	Low	5.6	70.2	12.4	No change	Sm. inc.	Medium	Common	Fair	Good	Infill +	Infill ++	1	31
eastern hophornbeam; ironw	Ostrya virginiana	WSL	Low	21.5	48.9	1.5	Lg. inc.	Lg. inc.	High	Rare	Good	Good			1	32
Siberian elm	Ulmus pumila	NDH	FIA	2.5	33.5	6.6	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	33
American hornbeam; muscle	Carpinus caroliniana	WSL	Low	17.4	30.8	0.9	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	34
eastern redcedar	Juniperus virginiana	WDH	Medium	3.8	27.7	1.5	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	2	35
Norway spruce	Picea abies	NSH	FIA	3.4	16.3	4.8	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	36
butternut	Juglans cinerea	NSLX	FIA	5.5	13.9	1.1	Unknown	Unknown	Low	Rare	FIA Only	FIA Only			0	37
shagbark hickory	Carya ovata	WSL	Medium	3.8	13.2	1.5	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	2	38
slippery elm	Ulmus rubra	WSL	Low	6.7	10.9	1.0	Sm. inc.	Sm. inc.	Medium	Rare	Fair	Fair	Infill +	Infill +	1	39
pin cherry	Prunus pensylvanica	NSL	Low	9.1	10.5	1.0	Very Lg. dec.	Very Lg. dec.	Medium	Rare	Lost	Lost			0	40
chokecherry	Prunus virginiana	NSLX	FIA	9.1	9.6	0.8	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	41
swamp white oak	Quercus bicolor	NSL	Low	2.3	7.0	3.1	Sm. inc.	Lg. inc.	Medium	Rare	Fair	Good	Infill +		2	42
serviceberry	Amelanchier spp.	NSL	Low	9.2	5.2	0.5	Very Lg. dec.	Very Lg. dec.	Medium	Rare	Lost	Lost			0	43
rock elm	Ulmus thomasii	NSLX	FIA	2.2	4.9	2.1	Unknown	Unknown	Low	Rare	FIA Only	FIA Only			0	44
black walnut	Juglans nigra	WDH	Low	2.3	4.3	1.9	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	2	45
white mulberry	Morus alba	NSL	FIA	2.3	2.2	1.0	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	46
black willow	Salix nigra	NSH	Low	2.3	1.9	0.8	No change	Lg. inc.	Low	Rare	Very Poor	Fair		Infill +	2	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
hackberry	Celtis occidentalis	WDH	Medium	1.1	1.1	1.0	Lg. inc.	Lg. inc.	High	Rare	Good	Good			2	48
balsam poplar	Populus balsamifera	NSH	Medium	0.2	0.6	0.1	Very Lg. dec.	Very Lg. dec.	Medium	Rare	Lost	Lost			0	49
honeylocust	Gleditsia triacanthos	NSH	Low	0.2	0.5	0.1	Sm. inc.	Sm. inc.	High	Rare	Good	Good			0	50
shortleaf pine	Pinus echinata	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			0	51
Virginia pine	Pinus virginiana	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			0	52
mountain maple	Acer spicatum	NSL	Low	0	0	0	Unknown	Unknown	High	Absent	Unknown	Unknown			0	53
sweet birch	Betula lenta	NDH	High	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat			0	54
river birch	Betula nigra	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Likely +	Likely +	3	55
pignut hickory	Carya glabra	WDL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +	3	56
black hickory	Carya texana	NDL	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	57
mockernut hickory	Carya alba	WDL	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat		Migrate +	3	58
sugarberry	Celtis laevigata	NDH	Medium	0	0	0	Unknown	New Habitat	Medium	Absent	Unknown	New Habitat			0	59
American beech	Fagus grandifolia	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Likely +	Likely +	3	60
sweetgum	Liquidambar styraciflua	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			0	61
yellow-poplar	Liriodendron tulipifera	WDH	High	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat		Migrate +	3	62
Osage-orange	Maclura pomifera	NDH	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat		Migrate +	3	63
red mulberry	Morus rubra	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Likely +	Likely +	3	64
blackgum	Nyssa sylvatica	WDL	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat		Migrate +	3	65
sycamore	Platanus occidentalis	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	66
eastern cottonwood	Populus deltoides	NSH	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate ++	3	67
blackjack oak	Quercus marilandica	NSL	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			3	68
chinkapin oak	Quercus muehlenbergii	NSL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +	3	69
pin oak	Quercus palustris	NSH	Low	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat		Migrate +	3	70
post oak	Quercus stellata	WDH	High	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			3	71
sassafras	Sassafras albidum	WSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	72