

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 7,022.7 2,711.5 486

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	
		Abundant	Common	High	Low	Scenario RCP45	Scenario RCP85	Scenario RCP45	Scenario RCP85	SHIFT RCP45	SHIFT RCP85
Ash	2					Increase	15	15	Very Good	4	4
Hickory	0					No Change	2	4	Good	10	10
Maple	3	7		15	14	Decrease	12	10	Fair	8	9
Oak	3	10		19	30	New	20	22	Poor	3	2
Pine	4	16		18	11	Unknown	7	5	Very Poor	4	2
Other	21	23		4					FIA Only	3	3
	33	56		56	55		56	56	Unknown	3	1
										35	31
											11
											16
											21

Potential Changes in Climate Variables

Temperature (°F)

	Scenario	2009	2039	2069	2099
Annual Average	CCSM45	37.9	39.4	42.4	42.6
	CCSM85	37.9	40.3	43.5	47.1
	GFDL45	37.9	41.1	44.1	45.9
	GFDL85	37.9	41.5	45.5	51.1
	HAD45	37.9	41.2	44.6	46.7
	HAD85	37.9	41.7	45.8	51.8
Growing Season May—Sep	CCSM45	58.5	60.0	62.6	62.8
	CCSM85	58.5	60.9	63.7	67.7
	GFDL45	58.5	62.5	66.2	68.5
	GFDL85	58.5	63.0	67.4	73.8
	HAD45	58.5	61.6	64.1	66.5
	HAD85	58.5	61.4	65.3	71.1
Coldest Month Average	CCSM45	5.2	6.4	9.0	9.0
	CCSM85	5.2	6.2	8.6	11.0
	GFDL45	5.2	8.6	10.7	11.5
	GFDL85	5.2	9.7	11.5	15.2
	HAD45	5.2	7.5	11.6	11.6
	HAD85	5.2	10.9	13.8	18.0
Warmest Month Average	CCSM45	65.2	66.9	68.5	68.9
	CCSM85	65.2	68.2	70.1	72.4
	GFDL45	65.2	69.6	71.3	72.9
	GFDL85	65.2	70.1	72.6	75.6
	HAD45	65.2	68.4	69.4	71.3
	HAD85	65.2	68.5	70.4	74.4

Precipitation (in)

	Scenario	2009	2039	2069	2099
Annual Total	CCSM45	29.6	30.6	30.8	30.0
	CCSM85	29.6	29.1	30.7	30.4
	GFDL45	29.6	31.8	33.2	31.8
	GFDL85	29.6	32.6	34.7	34.6
	HAD45	29.6	31.2	29.7	30.3
	HAD85	29.6	30.9	31.4	32.8
Growing Season May—Sep	CCSM45	18.3	18.5	17.7	17.5
	CCSM85	18.3	17.3	17.7	16.6
	GFDL45	18.3	19.7	19.5	18.9
	GFDL85	18.3	20.1	20.9	19.4
	HAD45	18.3	18.3	16.4	16.6
	HAD85	18.3	18.1	16.4	15.9

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-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
quaking aspen	Populus tremuloides	WDH	High	98.4	2098.2	13.8	No change	Sm. dec.	Medium	Abundant	Good	Fair			1	1
balsam fir	Abies balsamea	NDH	High	99.8	1973.2	12.9	Lg. dec.	Lg. dec.	Low	Abundant	Poor	Poor			0	2
black spruce	Picea mariana	NSH	High	87.5	1891.7	16.0	Lg. dec.	Lg. dec.	Medium	Abundant	Fair	Fair			0	3
paper birch	Betula papyrifera	WDH	High	100	1797.8	10.6	Sm. dec.	Lg. dec.	Medium	Abundant	Fair	Fair			0	4
northern white-cedar	Thuja occidentalis	WSH	High	56	623.2	7.1	Sm. dec.	No change	Medium	Abundant	Fair	Good			1	5
jack pine	Pinus banksiana	NSH	Medium	54.2	613.5	8.2	Sm. dec.	Sm. dec.	High	Abundant	Good	Good			1	6
black ash	Fraxinus nigra	WSH	Medium	55	521.3	5.6	No change	No change	Low	Abundant	Fair	Fair			0	7
white spruce	Picea glauca	NSL	Medium	89.6	454.8	3.1	Sm. dec.	No change	Medium	Common	Poor	Fair			1	8
red maple	Acer rubrum	WDH	High	76.3	437.1	3.5	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	9
tamarack (native)	Larix laricina	NSH	High	53.3	413.7	6.0	Sm. inc.	Sm. inc.	Low	Common	Fair	Fair			1	10
sugar maple	Acer saccharum	WDH	High	28.7	402.3	7.8	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	11
red pine	Pinus resinosa	NSH	Medium	41.2	315.0	4.7	Sm. inc.	Sm. inc.	Low	Common	Fair	Fair			1	12
eastern white pine	Pinus strobus	WDH	High	45.8	231.6	3.1	Lg. inc.	Lg. inc.	Low	Common	Good	Good			1	13
balsam poplar	Populus balsamifera	NSH	Medium	39.2	110.5	1.9	Sm. dec.	Lg. dec.	Medium	Common	Poor	Poor			0	14
mountain maple	Acer spicatum	NSL	Low	61.5	109.1	1.3	Lg. dec.	Lg. dec.	High	Common	Fair	Fair			1	15
yellow birch	Betula alleghaniensis	NDL	High	34	105.7	2.1	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	16
bigtooth aspen	Populus grandidentata	NSL	Medium	18.1	53.7	1.3	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	17
American basswood	Tilia americana	WSL	Medium	11.1	23.8	2.1	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	1	18
peachleaf willow	Salix amygdaloides	NSLX	FIA	15	18.0	0.8	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	19
green ash	Fraxinus pennsylvanica	WSH	Low	4.8	17.7	1.1	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	2	20
serviceberry	Amelanchier spp.	NSL	Low	25.5	14.8	0.3	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	21
bur oak	Quercus macrocarpa	NDH	Medium	4.4	14.4	2.3	Lg. inc.	Lg. inc.	High	Rare	Good	Good			2	22
pin cherry	Prunus pennsylvanica	NSL	Low	25.5	14.1	0.4	Lg. dec.	Very Lg. dec.	Medium	Rare	Very Poor	Lost			0	23
chokecherry	Prunus virginiana	NSLX	FIA	21.7	12.6	0.5	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	24
American mountain-ash	Sorbus americana	NSL	Low	17.6	10.4	0.4	Lg. dec.	Very Lg. dec.	Low	Rare	Very Poor	Lost			0	25
black willow	Salix nigra	NSH	Low	6.3	8.7	1.0	Lg. dec.	No change	Low	Rare	Very Poor	Very Poor			2	26
northern pin oak	Quercus ellipsoidalis	NSH	Medium	1.3	6.2	3.8	Lg. inc.	Lg. inc.	High	Rare	Good	Good			2	27
northern red oak	Quercus rubra	WDH	Medium	5.2	4.1	0.7	Lg. inc.	Lg. inc.	High	Rare	Good	Good			2	28
Scots pine	Pinus sylvestris	NSH	FIA	0.1	3.7	0.2	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	29
eastern hophornbeam; ironw	Ostrya virginiana	WSL	Low	2.8	3.0	1.0	Lg. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	Infill ++	2	30
black cherry	Prunus serotina	WDL	Medium	4.7	2.6	0.3	Lg. inc.	Lg. inc.	Low	Rare	Fair	Fair	Infill +	Infill +	2	31
American elm	Ulmus americana	WDH	Medium	2.8	1.1	0.4	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	32
wild plum	Prunus americana	NSLX	FIA	1.1	0.3	0.2	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	33
eastern redcedar	Juniperus virginiana	WDH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate ++	3	34
eastern hemlock	Tsuga canadensis	NSH	High	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat	Migrate ++	Migrate +	3	35
boxelder	Acer negundo	WSH	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat		Migrate +	3	36
silver maple	Acer saccharinum	NSH	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Likely +	Likely +	3	37
sweet birch	Betula lenta	NDH	High	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat			0	38
American hornbeam; musclev	Carpinus caroliniana	WSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +	3	39
bitternut hickory	Carya cordiformis	WSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	40
shagbark hickory	Carya ovata	WSL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	41
hackberry	Celtis occidentalis	WDH	Medium	0	0	0	Unknown	New Habitat	High	Absent	Unknown	New Habitat		Migrate +	3	42
American beech	Fagus grandifolia	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	43
white ash	Fraxinus americana	WDL	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat	Migrate +	Migrate ++	3	44
American holly	Ilex opaca	NSL	Medium	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	45
black walnut	Juglans nigra	WDH	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +	3	46
bigleaf magnolia	Magnolia macrophylla	NSL	Low	0	0	0	Unknown	New Habitat	Medium	Absent	Unknown	New Habitat			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
sycamore	Platanus occidentalis	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			0	48
eastern cottonwood	Populus deltoides	NSH	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +	3	49
white oak	Quercus alba	WDH	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +	Migrate ++	3	50
swamp white oak	Quercus bicolor	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +	3	51
scarlet oak	Quercus coccinea	WDL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			0	52
chestnut oak	Quercus prinus	NDH	High	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			0	53
black oak	Quercus velutina	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate ++	3	54
black locust	Robinia pseudoacacia	NDH	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +	3	55
slippery elm	Ulmus rubra	WSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +	3	56