

	sq. km	sq. mi	FIA Plots
Area of Region	10,289	3,972.7	359

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	2			High	17	12	Increase	13	14	Very Good	5	5	Likely	0	0
Hickory	0			Medium	18	28	No Change	4	5	Good	6	7	Infill	4	5
Maple	5	Abundant	8	Low	15	11	Decrease	15	13	Fair	8	8	Migrate	4	9
Oak	1	Common	13	FIA	2		New	17	18	Poor	8	8		8	14
Pine	3	Rare	13				Unknown	3	2	Very Poor	4	1			
Other	23	Absent	18							FIA Only	1	1			
	34		52		52	51		52	52	Unknown	1	0			
											33	30			

Potential Changes in Climate Variables

Temperature (°F)

	Scenario	2009	2039	2069	2099	
Annual Average	CCSM45	39.7	41.5	43.9	44.0	
	CCSM85	39.7	42.2	44.9	48.4	
	GFDL45	39.7	42.6	46.4	47.9	
	GFDL85	39.7	43.1	47.9	53.3	
	HAD45	39.7	42.9	45.8	47.6	
	HAD85	39.7	43.2	47.3	53.1	
Growing Season (May—Sep)	CCSM45	59.2	61.3	63.1	63.3	
	CCSM85	59.2	61.5	63.9	67.7	
	GFDL45	59.2	62.7	66.3	68.0	
	GFDL85	59.2	62.9	67.6	72.9	
	HAD45	59.2	62.0	64.6	66.6	
	HAD85	59.2	61.8	66.2	72.2	
Coldest Month Average	CCSM45	9.0	10.4	12.4	12.7	
	CCSM85	9.0	11.7	13.4	15.9	
	GFDL45	9.0	11.4	14.8	16.0	
	GFDL85	9.0	12.6	16.0	19.3	
	HAD45	9.0	12.2	14.7	15.9	
	HAD85	9.0	14.0	16.7	20.5	
Warmest Month Average	CCSM45	65.8	67.9	69.2	69.3	
	CCSM85	65.8	68.4	70.1	72.0	
	GFDL45	65.8	69.0	70.8	72.1	
	GFDL85	65.8	69.0	71.9	74.5	
	HAD45	65.8	68.8	70.1	71.4	
	HAD85	65.8	68.7	71.3	75.2	

Precipitation (in)

	Scenario	2009	2039	2069	2099	
Annual Total	CCSM45	40.7	39.8	40.5	44.2	
	CCSM85	40.7	42.4	41.4	43.4	
	GFDL45	40.7	44.8	46.9	46.3	
	GFDL85	40.7	45.0	46.3	47.3	
	HAD45	40.7	43.4	46.7	47.3	
	HAD85	40.7	44.3	44.8	49.1	
Growing Season (May—Sep)	CCSM45	18.5	18.1	17.5	19.2	
	CCSM85	18.5	19.5	18.6	17.9	
	GFDL45	18.5	18.3	18.3	17.9	
	GFDL85	18.5	19.1	18.5	17.4	
	HAD45	18.5	19.8	19.8	22.0	
	HAD85	18.5	19.2	19.8	22.5	

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>.

Section 211A

EcoMap 2007
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
balsam fir	Abies balsamea	NDH	High	96.1	2602.2	21.2	Lg. dec.	Lg. dec.	Low	Abundant	Poor	Poor			0	1
northern white-cedar	Thuja occidentalis	WDH	High	83	1414.5	12.6	Sm. dec.	Sm. dec.	Medium	Abundant	Fair	Fair			0	2
red maple	Acer rubrum	WDH	High	93.1	969.5	8.1	Sm. inc.	Sm. inc.	High	Abundant	Very Good	Very Good			1	3
red spruce	Picea rubens	NDH	High	82	827.6	7.7	Sm. dec.	Sm. dec.	Low	Abundant	Fair	Fair			0	4
sugar maple	Acer saccharum	WDH	High	65.8	606.6	6.7	Sm. inc.	Sm. inc.	High	Abundant	Very Good	Very Good			1	5
quaking aspen	Populus tremuloides	WDH	High	63.1	580.2	7.3	Sm. inc.	Sm. inc.	Medium	Abundant	Very Good	Very Good			1	6
yellow birch	Betula alleghaniensis	NDL	High	73.9	544.8	5.6	Sm. dec.	Sm. dec.	Medium	Abundant	Fair	Fair			0	7
white spruce	Picea glauca	NSL	Medium	75.9	512.9	5.3	Sm. dec.	Sm. dec.	Medium	Abundant	Fair	Fair			0	8
American beech	Fagus grandifolia	WDH	High	54.2	487.9	6.4	No change	No change	Medium	Common	Fair	Fair			1	9
paper birch	Betula papyrifera	WDH	High	77.1	459.4	4.1	No change	No change	Medium	Common	Fair	Fair			1	10
black spruce	Picea mariana	NSH	High	37.8	305.7	7.7	Sm. dec.	Sm. dec.	Medium	Common	Poor	Poor			0	11
balsam poplar	Populus balsamifera	NSH	Medium	35.7	246.2	6.0	Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor			0	12
eastern hemlock	Tsuga canadensis	NSH	High	33.6	179.7	4.0	Lg. inc.	Lg. inc.	Low	Common	Good	Good			1	13
tamarack (native)	Larix laricina	NSH	High	32.3	164.0	4.9	Sm. dec.	Sm. dec.	Low	Common	Poor	Poor			0	14
eastern white pine	Pinus strobus	WDH	High	31.2	144.3	3.4	Lg. inc.	Lg. inc.	Low	Common	Good	Good			1	15
black ash	Fraxinus nigra	WDH	Medium	42	136.4	2.8	Sm. inc.	Sm. inc.	Low	Common	Fair	Fair			1	16
white ash	Fraxinus americana	WDL	Medium	31	108.8	2.7	Lg. inc.	Lg. inc.	Low	Common	Good	Good			1	17
striped maple	Acer pensylvanicum	NSL	Medium	49.7	88.1	1.2	Sm. dec.	Lg. dec.	Medium	Common	Poor	Poor			0	18
Norway spruce	Picea abies	NSH	FIA	2.2	86.0	17.5	Unknown	Unknown	NA	Common	NNIS	NNIS			0	19
eastern hophornbeam; ironw	Ostrya virginiana	WSL	Low	35.3	82.2	1.7	Sm. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	20
bigtooth aspen	Populus grandidentata	NSL	Medium	22.3	80.8	2.8	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	21
red pine	Pinus resinosa	NSH	Medium	4.5	34.8	7.0	No change	No change	Low	Rare	Very Poor	Very Poor			2	22
northern red oak	Quercus rubra	WDH	Medium	1.5	33.1	16.9	Lg. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	Infill ++	2	23
gray birch	Betula populifolia	NSL	Low	3.9	26.8	1.5	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	1	24
chokecherry	Prunus virginiana	NSLX	FIA	5.7	16.4	2.8	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	25
pin cherry	Prunus pensylvanica	NSL	Low	16.2	16.2	0.8	Lg. dec.	Very Lg. dec.	Medium	Rare	Very Poor	Lost			0	26
mountain maple	Acer spicatum	NSL	Low	22.1	13.2	0.6	Very Lg. dec.	Very Lg. dec.	High	Rare	Lost	Lost			0	27
American elm	Ulmus americana	WDH	Medium	8.5	9.5	0.9	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	2	28
black cherry	Prunus serotina	WDL	Medium	2.7	7.4	2.4	Lg. inc.	Lg. inc.	Low	Rare	Fair	Fair	Infill +	Infill +	2	29
jack pine	Pinus banksiana	NSH	Medium	0.5	4.7	2.5	Sm. dec.	Lg. dec.	High	Rare	Poor	Poor			0	30
serviceberry	Amelanchier spp.	NSL	Low	6.7	4.6	0.5	Sm. dec.	No change	Medium	Rare	Very Poor	Poor		Infill +	1	31
American mountain-ash	Sorbus americana	NSL	Low	6.2	2.1	0.2	Lg. dec.	Very Lg. dec.	Low	Rare	Very Poor	Lost			0	32
American basswood	Tilia americana	WSL	Medium	1	0.3	0.3	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	33
boxelder	Acer negundo	WSH	Low	1	0.3	0.3	Lg. dec.	Lg. inc.	High	Rare	Poor	Good			2	34
eastern redcedar	Juniperus virginiana	WDH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	35
sweet birch	Betula lenta	NDH	High	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	36
American hornbeam; muscle	Carpinus caroliniana	WSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +	3	37
bitternut hickory	Carya cordiformis	WSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat		Migrate +	3	38
pignut hickory	Carya glabra	WDL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	39
shagbark hickory	Carya ovata	WSL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	40
green ash	Fraxinus pennsylvanica	WSH	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +	3	41
black walnut	Juglans nigra	WDH	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	42
yellow-poplar	Liriodendron tulipifera	WDH	High	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			0	43
blackgum	Nyssa sylvatica	WDL	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			3	44
sycamore	Platanus occidentalis	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			0	45
white oak	Quercus alba	WDH	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +	Migrate ++	3	46
swamp white oak	Quercus bicolor	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	47



Section 211A

EcoMap 2007

Climate Change Atlas Tree Species

Current and Potential Future Habitat, Capability, and Migration

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

Common Name	Scientific Name	Range	MR	%Cell	FIAsum	FIAiv	ChngCl45	ChngCl85	Adap	Abund	Capabil45	Capabil85	SHIFT45	SHIFT85	SSO	N
scarlet oak	Quercus coccinea	WDL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +	3	48
chestnut oak	Quercus prinus	NDH	High	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			3	49
black oak	Quercus velutina	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate ++	3	50
black locust	Robinia pseudoacacia	NDH	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +	3	51
slippery elm	Ulmus rubra	WSL	Low	0	0	0	Unknown	New Habitat	Medium	Absent	Unknown	New Habitat			3	52