S29 E83

One x One Degree
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

	sq. km	sq. mi	FIA Plots
Area of Region	3,546.0	1,369.1	127

Species Information

The columns below provide breif 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
Ash	4
Hickory	2
Maple	1
Oak	8
Pine	5
Other	29
	49

Abundance	
Abundant	6
Common	16
Rare	27
Absent	12
	61

	Model Reliability	Adaptability
High	11	13
Medium	31	39
Low	20	10
FIA	2	
	64	**62**

Potential Change in Habitat Suitability	Scenario RCP45	Scenario RCP85
Increase	12	14
No Change	9	9
Decrease	26	24
New	3	3
Unknown	14	14
	64	**64**

Capability to Cope or Persist	Scenario RCP45	Scenario RCP85
Very Good	6	7
Good	7	7
Fair	6	7
Poor	11	9
Very Poor	13	13
FIA Only	2	2
Unknown	12	12
	57	**57**

Migration Potential	SHIFT RCP45	SHIFT RCP85
Likely	0	0
Infill	4	2
Migrate	0	2
	4	**4**

Potential Changes in Climate Variables

Temperature (°F)

	Scenario	2009	2039	2069	2099
Annual Average	CCSM45	68.3	69.8	71.5	71.4
	CCSM85	68.3	70.0	72.2	74.4
	GFDL45	68.3	70.9	72.7	73.5
	GFDL85	68.3	70.8	73.8	77.3
	HAD45	68.3	70.3	72.8	74.1
	HAD85	68.3	70.8	73.8	77.5
Growing Season May—Sep	CCSM45	78.8	80.0	81.2	81.5
	CCSM85	78.8	80.0	82.2	84.7
	GFDL45	78.8	81.2	82.9	84.0
	GFDL85	78.8	81.3	84.2	88.0
	HAD45	78.8	81.6	83.7	85.1
	HAD85	78.8	81.8	85.8	89.2
Coldest Month Average	CCSM45	51.9	54.3	55.2	54.8
	CCSM85	51.9	53.9	55.0	56.2
	GFDL45	51.9	54.7	55.1	55.6
	GFDL85	51.9	54.2	55.4	56.3
	HAD45	51.9	51.7	53.0	53.8
	HAD85	51.9	52.5	53.4	55.4
Warmest Month Average	CCSM45	81.3	82.7	83.4	83.6
	CCSM85	81.3	82.8	84.0	85.4
	GFDL45	81.3	83.7	84.5	85.2
	GFDL85	81.3	83.9	85.3	87.3
	HAD45	81.3	84.6	85.7	86.2
	HAD85	81.3	84.7	87.0	88.5

Precipitation (in)

	Scenario	2009	2039	2069	2099
Annual Total	CCSM45	55.9	60.4	62.9	63.0
	CCSM85	55.9	59.0	62.0	61.9
	GFDL45	55.9	63.3	65.5	68.2
	GFDL85	55.9	60.8	67.4	64.8
	HAD45	55.9	54.3	54.9	58.3
	HAD85	55.9	54.7	52.3	53.5
Growing Season May—Sep	CCSM45	31.9	34.8	35.9	35.0
	CCSM85	31.9	33.0	35.8	35.2
	GFDL45	31.9	37.5	38.4	39.3
	GFDL85	31.9	36.7	40.7	39.3
	HAD45	31.9	31.1	30.7	30.6
	HAD85	31.9	30.2	26.6	26.7

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.

S29 E83

One x One Degree

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
slash pine	Pinus elliottii	NDH	High	89.3	3812.7	28.9	No change	No change	Medium	Abundant	Good	Good			1	1
laurel oak	Quercus laurifolia	NDH	Medium	84.9	1100.5	7.6	Sm. dec.	Sm. dec.	Medium	Abundant	Fair	Fair			0	2
pond cypress	Taxodium ascendens	NSH	Medium	60.3	863.5	10.9	Sm. inc.	Lg. inc.	Medium	Abundant	Very Good	Very Good			1	3
sweetgum	Liquidambar styraciflua	WDH	High	69.3	565.7	4.9	Sm. dec.	Sm. dec.	Medium	Abundant	Fair	Fair			0	4
live oak	Quercus virginiana	NDH	High	55.9	506.0	4.9	Lg. inc.	Lg. inc.	Medium	Abundant	Very Good	Very Good			1	5
loblolly pine	Pinus taeda	WDH	High	46.4	502.1	8.1	Sm. inc.	Sm. inc.	Medium	Abundant	Very Good	Very Good			1	6
bald cypress	Taxodium distichum	NSH	Medium	56.9	485.1	5.3	No change	No change	Medium	Common	Fair	Fair			1	7
swamp tupelo	Nyssa biflora	NDH	Medium	65	468.3	5.0	Sm. inc.	Sm. inc.	Low	Common	Fair	Fair			1	8
cabbage palmetto	Sabal palmetto	NDH	Medium	44.5	438.1	5.6	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			0	9
water oak	Quercus nigra	WDH	High	65.2	402.6	3.7	No change	No change	Medium	Common	Fair	Fair			1	10
red maple	Acer rubrum	WDH	High	77.1	374.1	3.3	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good			1	11
sand pine	Pinus clausa	NDH	High	7.2	214.1	20.7	No change	No change	Low	Common	Poor	Poor	Infill +		0	12
green ash	Fraxinus pennsylvanica	WSH	Low	32.3	204.6	3.2	Sm. dec.	No change	Medium	Common	Poor	Fair			1	13
redbay	Persea borbonia	NSL	Low	43.7	164.0	2.3	No change	Sm. inc.	High	Common	Good	Very Good			1	14
sweetbay	Magnolia virginiana	NSL	Medium	41.7	151.4	2.3	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	15
American hornbeam; muscle	Carpinus caroliniana	WSL	Low	36.1	124.4	2.5	Sm. dec.	Sm. dec.	Medium	Common	Poor	Poor			0	16
pumpkin ash	Fraxinus profunda	NSH	FIA	26.2	122.0	4.1	Unknown	Unknown	NA	Common	FIA Only	FIA Only			0	17
American elm	Ulmus americana	WDH	Medium	62.2	116.8	1.3	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	18
water tupelo	Nyssa aquatica	NSH	Medium	8.3	115.7	5.4	Sm. dec.	Sm. dec.	Low	Common	Poor	Poor	Infill +		0	19
loblolly-bay	Gordonia lasianthus	NSH	Medium	6.8	67.1	6.3	No change	No change	Medium	Common	Fair	Fair	Infill +	Infill +	1	20
eastern redcedar	Juniperus virginiana	WDH	Medium	18.6	54.2	2.3	Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor	Infill +		0	21
Carolina ash	Fraxinus caroliniana	NSL	FIA	16.7	51.7	2.3	Unknown	Unknown	NA	Common	FIA Only	FIA Only			0	22
southern magnolia	Magnolia grandiflora	NSL	Low	9.1	44.6	1.9	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	23
turkey oak	Quercus laevis	NSH	Medium	13.3	30.1	2.1	Lg. inc.	Sm. inc.	High	Rare	Good	Good			1	24
pond pine	Pinus serotina	NSH	Medium	2.8	28.5	10.1	No change	No change	Low	Rare	Very Poor	Very Poor			0	25
longleaf pine	Pinus palustris	NSH	Medium	8.6	25.9	3.1	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			1	26
pignut hickory	Carya glabra	WDL	Medium	7.8	24.2	1.1	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	27
swamp chestnut oak	Quercus michauxii	NSL	Low	1.9	23.1	5.6	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	28
blackgum	Nyssa sylvatica	WDL	Medium	11.7	21.3	0.7	Lg. inc.	Lg. inc.	High	Rare	Good	Good			1	29
white ash	Fraxinus americana	WDL	Medium	2.8	20.4	7.2	Sm. dec.	Lg. dec.	Low	Rare	Very Poor	Very Poor			0	30
American holly	Ilex opaca	NSL	Medium	4.2	20.3	3.2	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	31
common persimmon	Diospyros virginiana	NSL	Low	15.6	20.3	0.5	Lg. dec.	Lg. dec.	High	Rare	Poor	Poor			1	32
black cherry	Prunus serotina	WDL	Medium	7.3	18.8	1.0	No change	No change	Low	Rare	Very Poor	Very Poor			0	33
red mulberry	Morus rubra	NSL	Low	1.4	13.3	2.3	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	34
slippery elm	Ulmus rubra	WSL	Low	3.8	8.7	1.1	Sm. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	35
winged elm	Ulmus alata	WDL	Medium	6.1	7.9	0.6	Lg. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	36
hackberry	Celtis occidentalis	WDH	Medium	5.4	7.9	1.4	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor			0	37
black willow	Salix nigra	NSH	Low	5.6	7.5	1.3	Sm. dec.	Lg. dec.	Low	Rare	Very Poor	Very Poor			0	38
mockernut hickory	Carya alba	WDL	Medium	8.8	6.9	0.5	Lg. dec.	Very Lg. dec.	High	Rare	Poor	Lost			1	39
bluejack oak	Quercus incana	NSL	Low	7.8	6.4	0.7	Very Lg. dec.	Very Lg. dec.	Medium	Rare	Lost	Lost			0	40
southern red oak	Quercus falcata	WDL	Medium	1.3	4.8	0.8	Lg. dec.	Sm. dec.	High	Rare	Poor	Poor		Infill +	2	41
post oak	Quercus stellata	WDH	High	1.3	4.4	0.8	Very Lg. dec.	Lg. inc.	High	Rare	Lost	Good			2	42
flowering dogwood	Cornus florida	WDL	Medium	6.7	4.0	0.4	Very Lg. dec.	Very Lg. dec.	Medium	Rare	Lost	Lost			0	43
eastern hophornbeam; ironw	Ostrya virginiana	WSL	Low	1.9	3.6	0.9	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor			0	44
river birch	Betula nigra	NSL	Low	1.4	3.0	0.5	No change	No change	Medium	Rare	Poor	Poor			0	45
black locust	Robinia pseudoacacia	NDH	Low	2.8	2.2	0.8	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	46
water elm	Planera aquatica	NSL	Low	2.8	1.8	0.6	Very Lg. dec.	Very Lg. dec.	Medium	Rare	Lost	Lost			0	47

S29 E83

One x One Degree

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
sugarberry	Celtis laevigata	NDH	Medium	2.8	0.9	0.3	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	48
eastern redbud	Cercis canadensis	NSL	Low	2.8	0.8	0.3	Sm. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	49
Atlantic white-cedar	Chamaecyparis thyoides	NSH	Low	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat			3	50
shortleaf pine	Pinus echinata	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +	3	51
spruce pine	Pinus glabra	NSL	Low	0	0	0	Unknown	Unknown	Medium	Modeled	Unknown	Unknown			0	52
striped maple	Acer pensylvanicum	NSL	Medium	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	53
pawpaw	Asimina triloba	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	54
shagbark hickory	Carya ovata	WSL	Medium	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	55
American beech	Fagus grandifolia	WDH	High	0	0	0	Unknown	Unknown	Medium	Modeled	Unknown	Unknown			0	56
silverbell	Halesia spp.	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	57
Osage-orange	Maclura pomifera	NDH	Medium	0	0	0	Unknown	Unknown	High	Absent	Unknown	Unknown			0	58
bigleaf magnolia	Magnolia macrophylla	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	59
sourwood	Oxydendrum arboreum	NDL	High	0	0	0	Unknown	Unknown	High	Absent	Unknown	Unknown			0	60
overcup oak	Quercus lyrata	NSL	Medium	0	0	0	Unknown	Unknown	Low	Modeled	Unknown	Unknown			0	61
nuttall oak	Quercus texana	NSH	Medium	0	0	0	Unknown	Unknown	High	Absent	Unknown	Unknown			0	62
American basswood	Tilia americana	WSL	Medium	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	63
cedar elm	Ulmus crassifolia	NDH	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat		Migrate +	3	64