S38 E83

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

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Iverson, Peters, Prasad, Matthews

	sq. km	sq. mi	FIA Plots
Area of Region	9,683.1	3,738.7	245

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	5
Maple	5
Oak	12
Pine	5
Other	38
	69

Abundance	
Abundant	6
Common	30
Rare	33
Absent	19
	88

	Model Reliability	Adaptability
High	20	27
Medium	28	45
Low	38	15
FIA	3	
	89	**87**

Potential Change in Habitat Suitability	Scenario RCP45	Scenario RCP85
Increase	25	25
No Change	11	13
Decrease	30	28
New	11	13
Unknown	12	10
	89	**89**

Capability to Cope or Persist	Scenario RCP45	Scenario RCP85
Very Good	12	14
Good	19	15
Fair	6	12
Poor	10	7
Very Poor	16	14
FIA Only	1	1
Unknown	9	7
	73	**70**

Migration Potential	SHIFT RCP45	SHIFT RCP85
Likely	0	1
Infill	11	12
Migrate	4	5
	15	**18**

Potential Changes in Climate Variables

Temperature (°F)

	Scenario	2009	2039	2069	2099
Annual Average	CCSM45	53.9	55.7	58.1	58.3
	CCSM85	53.9	56.2	58.8	61.9
	GFDL45	53.9	56.9	59.5	60.3
	GFDL85	53.9	57.0	60.5	64.4
	HAD45	53.9	56.5	60.0	61.4
	HAD85	53.9	57.0	61.6	65.9
Growing Season May—Sep	CCSM45	69.7	71.5	73.7	74.3
	CCSM85	69.7	72.0	74.7	78.8
	GFDL45	69.7	73.3	76.5	77.8
	GFDL85	69.7	73.6	77.9	82.3
	HAD45	69.7	72.9	76.3	78.1
	HAD85	69.7	73.3	79.6	83.9
Coldest Month Average	CCSM45	29.3	30.7	32.2	32.7
	CCSM85	29.3	32.0	32.9	34.7
	GFDL45	29.3	33.1	33.5	34.0
	GFDL85	29.3	31.8	32.9	33.7
	HAD45	29.3	30.0	32.4	32.6
	HAD85	29.3	31.1	33.1	35.0
Warmest Month Average	CCSM45	75.1	76.8	78.1	78.6
	CCSM85	75.1	77.6	79.3	81.2
	GFDL45	75.1	78.6	80.7	81.6
	GFDL85	75.1	79.3	82.2	84.6
	HAD45	75.1	79.0	81.8	83.0
	HAD85	75.1	80.7	85.2	87.6

Precipitation (in)

	Scenario	2009	2039	2069	2099
Annual Total	CCSM45	44.5	46.6	49.9	49.4
	CCSM85	44.5	48.7	50.2	53.6
	GFDL45	44.5	49.0	50.3	54.1
	GFDL85	44.5	46.6	52.0	54.6
	HAD45	44.5	46.0	47.4	46.6
	HAD85	44.5	45.5	43.0	46.8
Growing Season May—Sep	CCSM45	20.3	20.6	21.8	21.3
	CCSM85	20.3	20.5	20.2	21.3
	GFDL45	20.3	22.6	21.3	22.6
	GFDL85	20.3	20.8	21.3	21.9
	HAD45	20.3	21.0	18.8	19.4
	HAD85	20.3	20.0	16.7	17.5

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.

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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	64.9	851.3	10.9	Lg. dec.	Lg. dec.	High	Abundant	Good	Good			1	1
white oak	Quercus alba	WDH	Medium	65.8	831.6	9.9	No change	Sm. dec.	High	Abundant	Very Good	Good			1	2
yellow-poplar	Liriodendron tulipifera	WDH	High	59.5	679.4	9.6	Sm. dec.	Lg. dec.	High	Abundant	Good	Good			1	3
chestnut oak	Quercus prinus	NDH	High	41.9	658.9	12.1	Lg. dec.	Lg. dec.	High	Abundant	Good	Good			1	4
eastern redcedar	Juniperus virginiana	WDH	Medium	39.8	585.9	10.3	Sm. inc.	Sm. inc.	Medium	Abundant	Very Good	Very Good			1	5
sugar maple	Acer saccharum	WDH	High	64.4	560.6	7.4	No change	No change	High	Abundant	Very Good	Very Good			1	6
black locust	Robinia pseudoacacia	NDH	Low	48.5	406.7	6.6	Sm. dec.	No change	Medium	Common	Poor	Fair			1	7
white ash	Fraxinus americana	WDL	Medium	49.6	402.9	5.7	No change	No change	Low	Common	Poor	Poor			0	8
black walnut	Juglans nigra	WDH	Low	40.4	378.5	5.6	Sm. dec.	No change	Medium	Common	Poor	Fair			1	9
scarlet oak	Quercus coccinea	WDL	Medium	49.7	325.6	6.0	Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor			0	10
pignut hickory	Carya glabra	WDL	Medium	65.6	286.5	3.6	No change	Sm. dec.	Medium	Common	Fair	Poor			1	11
northern red oak	Quercus rubra	WDH	Medium	49.4	251.0	4.4	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good			1	12
black oak	Quercus velutina	WDH	High	51	233.4	3.7	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	13
mockernut hickory	Carya alba	WDL	Medium	48.8	226.3	4.1	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good			1	14
hackberry	Celtis occidentalis	WDH	Medium	26.1	220.0	5.8	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good			1	15
slippery elm	Ulmus rubra	WSL	Low	40.3	216.1	3.7	Sm. dec.	No change	Medium	Common	Poor	Fair			1	16
American elm	Ulmus americana	WDH	Medium	43.1	216.1	3.8	Sm. inc.	Lg. inc.	Medium	Common	Good	Very Good			1	17
Virginia pine	Pinus virginiana	NDH	High	26.3	191.7	6.0	No change	No change	Medium	Common	Fair	Fair			1	18
green ash	Fraxinus pennsylvanica	WSH	Low	31	189.4	5.0	Sm. inc.	Lg. inc.	Medium	Common	Good	Very Good			1	19
blackgum	Nyssa sylvatica	WDL	Medium	44.3	178.9	3.1	No change	Sm. inc.	High	Common	Good	Very Good			1	20
black cherry	Prunus serotina	WDL	Medium	39.4	171.5	3.0	Sm. inc.	Sm. inc.	Low	Common	Fair	Fair			1	21
shagbark hickory	Carya ovata	WSL	Medium	43.9	161.8	2.6	Sm. inc.	No change	Medium	Common	Good	Fair			1	22
sourwood	Oxydendrum arboreum	NDL	High	35.2	136.4	3.0	Sm. dec.	Lg. dec.	High	Common	Fair	Fair			1	23
chinkapin oak	Quercus muehlenbergii	NSL	Medium	29.9	132.0	3.7	Sm. inc.	No change	Medium	Common	Good	Fair			1	24
sassafras	Sassafras albidum	WSL	Low	39.1	124.7	2.4	Sm. inc.	No change	Medium	Common	Good	Fair			1	25
bitternut hickory	Carya cordiformis	WSL	Low	30.5	123.4	2.7	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good			1	26
eastern redbud	Cercis canadensis	NSL	Low	44.4	119.3	2.1	No change	No change	Medium	Common	Fair	Fair			1	27
boxelder	Acer negundo	WSH	Low	24.1	116.5	3.7	Sm. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	28
sycamore	Platanus occidentalis	NSL	Low	22.3	114.0	3.6	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	29
American beech	Fagus grandifolia	WDH	High	33.4	110.2	2.8	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	30
Osage-orange	Maclura pomifera	NDH	Medium	5.9	79.8	4.2	No change	No change	High	Common	Good	Good	Infill ++	Infill ++	1	31
shingle oak	Quercus imbricaria	NDH	Medium	9.3	64.4	4.8	Sm. dec.	Sm. dec.	Medium	Common	Poor	Poor	Infill +	Infill +	0	32
post oak	Quercus stellata	WDH	High	11.7	64.2	4.2	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good	Infill ++	Infill ++	1	33
shellbark hickory	Carya laciniosa	NSL	Low	9.9	56.9	3.0	Sm. dec.	Sm. dec.	Medium	Common	Poor	Poor	Infill +	Infill +	0	34
honeylocust	Gleditsia triacanthos	NSH	Low	17.4	52.7	1.3	Sm. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	35
eastern hemlock	Tsuga canadensis	NSH	High	7.2	51.9	7.2	Lg. dec.	Lg. dec.	Low	Common	Very Poor	Very Poor			0	36
sweet birch	Betula lenta	NDH	High	9.4	46.4	3.7	Sm. dec.	Sm. dec.	Low	Rare	Very Poor	Very Poor			0	37
yellow buckeye	Aesculus flava	NSL	Low	8.3	45.3	4.8	Lg. dec.	Lg. dec.	Low	Rare	Very Poor	Very Poor			0	38
eastern white pine	Pinus strobus	WDH	High	4.2	43.4	8.2	Very Lg. dec.	Very Lg. dec.	Low	Rare	Lost	Lost			0	39
Ohio buckeye	Aesculus glabra	NSL	Low	5.8	41.1	1.5	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	40
American basswood	Tilia americana	WSL	Medium	18.9	40.1	2.1	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	41
pawpaw	Asimina triloba	NSL	Low	14.1	39.9	2.2	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	42
shortleaf pine	Pinus echinata	WDH	High	12.3	38.7	1.9	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	1	43
loblolly pine	Pinus taeda	WDH	High	1.2	37.0	11.3	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	44
flowering dogwood	Cornus florida	WDL	Medium	30.9	31.7	1.0	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			1	45
American hornbeam; muscle	Carpinus caroliniana	WSL	Low	18	31.3	1.6	No change	Lg. inc.	Medium	Rare	Poor	Good			1	46
sweetgum	Liquidambar styraciflua	WDH	High	7.2	28.8	4.0	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	2	47

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pin oak	Quercus palustris	NSH	Low	2.2	28.4	8.5	Sm. dec.	Sm. dec.	Low	Rare	Very Poor	Very Poor			2	48
pitch pine	Pinus rigida	NSH	High	4.7	22.6	2.9	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	49
serviceberry	Amelanchier spp.	NSL	Low	14.3	22.3	1.2	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	50
river birch	Betula nigra	NSL	Low	2	20.3	9.5	Sm. dec.	No change	Medium	Rare	Very Poor	Poor		Infill +	2	51
blue ash	Fraxinus quadrangulata	NSL	Low	11.2	18.2	1.5	Sm. dec.	Sm. dec.	Low	Rare	Very Poor	Very Poor			0	52
ailanthus	Ailanthus altissima	NSL	FIA	3.3	18.1	1.4	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	53
bigtooth aspen	Populus grandidentata	NSL	Medium	3.1	15.0	4.8	Very Lg. dec.	Very Lg. dec.	Medium	Rare	Lost	Lost			0	54
Shumard oak	Quercus shumardii	NSL	Low	4.4	11.8	1.2	Sm. inc.	Sm. inc.	High	Rare	Good	Good	Infill ++	Infill ++	2	55
silver maple	Acer saccharinum	NSH	Low	6.2	10.1	3.5	No change	No change	High	Rare	Fair	Fair	Infill +	Infill +	2	56
eastern hophornbeam; ironw	Ostrya virginiana	WSL	Low	9	8.4	0.7	Sm. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	Infill ++	1	57
black maple	Acer nigrum	NSH	Low	2.2	8.4	2.3	Lg. dec.	Lg. dec.	High	Rare	Poor	Poor			0	58
eastern cottonwood	Populus deltoides	NSH	Low	6.2	8.1	3.0	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			2	59
red mulberry	Morus rubra	NSL	Low	2.1	3.2	1.5	No change	Sm. inc.	Medium	Rare	Poor	Fair	Infill +	Infill +	2	60
Kentucky coffeetree	Gymnocladus dioicus	NSLX	FIA	1	3.0	2.9	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	61
common persimmon	Diospyros virginiana	NSL	Low	1.8	2.3	0.5	Lg. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	Infill ++	2	62
bur oak	Quercus macrocarpa	NDH	Medium	0.1	2.3	0.3	Very Lg. dec.	Very Lg. dec.	High	Rare	Lost	Lost			0	63
black ash	Fraxinus nigra	WSH	Medium	1	2.0	2.0	Sm. dec.	Sm. dec.	Low	Rare	Very Poor	Very Poor			0	64
mountain or Fraser magnolia	Magnolia fraseri	NSL	Low	1	1.9	1.9	Sm. dec.	Sm. dec.	Low	Rare	Very Poor	Very Poor			0	65
paulownia	Paulownia tomentosa	NSL	FIA	1.1	1.1	0.3	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	66
southern red oak	Quercus falcata	WDL	Medium	1	1.0	1.0	Lg. inc.	Lg. inc.	High	Rare	Good	Good			2	67
cucumbertree	Magnolia acuminata	NSL	Low	1	0.8	0.8	Lg. dec.	Very Lg. dec.	Medium	Rare	Very Poor	Lost			0	68
yellow birch	Betula alleghaniensis	NDL	High	1	0.3	0.3	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	69
Atlantic white-cedar	Chamaecyparis thyoides	NSH	Low	0	0	0	Unknown	Unknown	Low	Absent	Unknown	Unknown			0	70
red spruce	Picea rubens	NDH	High	0	0	0	Unknown	Unknown	Low	Absent	Unknown	Unknown			0	71
florida maple	Acer barbatum	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +		3	72
striped maple	Acer pensylvanicum	NSL	Medium	0	0	0	Unknown	New Habitat	Medium	Absent	Unknown	New Habitat			3	73
mountain maple	Acer spicatum	NSL	Low	0	0	0	Unknown	Unknown	High	Absent	Unknown	Unknown			0	74
cittamwood/gum bumelia	Sideroxylon lanuginosum ssp.	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			3	75
pecan	Carya illinoinensis	NSH	Low	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat		Migrate ++	3	76
black hickory	Carya texana	NDL	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	77
sugarberry	Celtis laevigata	NDH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate ++	3	78
American holly	Ilex opaca	NSL	Medium	0	0	0	Unknown	Unknown	Medium	Modeled	Unknown	Unknown			0	79
bigleaf magnolia	Magnolia macrophylla	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	80
redbay	Persea borbonia	NSL	Low	0	0	0	Unknown	Unknown	High	Absent	Unknown	Unknown			0	81
pin cherry	Prunus pensylvanica	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	82
cherrybark oak; swamp red o	Quercus pagoda	NSL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	83
blackjack oak	Quercus marilandica	NSL	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +	Migrate ++	3	84
swamp chestnut oak	Quercus michauxii	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	85
water oak	Quercus nigra	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +	3	86
black willow	Salix nigra	NSH	Low	0	0	0	Unknown	New Habitat	Low	Absent	Unknown	New Habitat		Likely +	3	87
winged elm	Ulmus alata	WDL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate ++	3	88
cedar elm	Ulmus crassifolia	NDH	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat			0	89