Hot Springs

National Park

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	8,300.0	3,204.6	290

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	2
Hickory	6
Maple	4
Oak	14
Pine	2
Other	30
	58

Abundance	
Abundant	4
Common	18
Rare	36
Absent	24
	82

	Model Reliability	Adaptability
High	17	24
Medium	32	50
Low	33	9
FIA	2	
	84	**83**

Potential Change in Habitat Suitability	Scenario RCP45	Scenario RCP85
Increase	33	36
No Change	11	10
Decrease	12	10
New	18	19
Unknown	10	9
	84	**84**

Capability to Cope or Persist	Scenario RCP45	Scenario RCP85
Very Good	12	14
Good	20	20
Fair	7	7
Poor	8	8
Very Poor	9	7
FIA Only	1	1
Unknown	8	7
	65	**64**

Migration Potential	SHIFT RCP45	SHIFT RCP85
Likely	3	3
Infill	11	11
Migrate	8	13
	22	**27**

Potential Changes in Climate Variables

Temperature (°F)

	Scenario	2009	2039	2069	2099
Annual Average	CCSM45	61.2	63.0	65.0	65.3
	CCSM85	61.2	63.4	65.8	68.5
	GFDL45	61.2	64.2	65.9	67.0
	GFDL85	61.2	64.2	66.9	70.6
	HAD45	61.2	63.7	66.6	67.9
	HAD85	61.2	64.0	68.5	72.2
Growing Season May—Sep	CCSM45	75.9	77.6	79.3	79.8
	CCSM85	75.9	78.1	80.4	83.9
	GFDL45	75.9	79.4	81.2	83.3
	GFDL85	75.9	79.7	82.8	87.4
	HAD45	75.9	78.9	81.8	82.8
	HAD85	75.9	79.3	85.4	88.6
Coldest Month Average	CCSM45	39.4	41.8	42.9	43.0
	CCSM85	39.4	42.1	43.1	44.6
	GFDL45	39.4	43.2	43.6	43.6
	GFDL85	39.4	40.5	42.0	42.6
	HAD45	39.4	40.4	42.3	42.7
	HAD85	39.4	41.6	43.4	45.2
Warmest Month Average	CCSM45	81.6	83.2	84.1	84.2
	CCSM85	81.6	83.7	84.6	86.4
	GFDL45	81.6	86.3	87.0	88.4
	GFDL85	81.6	86.0	87.5	90.9
	HAD45	81.6	85.3	87.0	87.3
	HAD85	81.6	86.3	89.8	90.8

Precipitation (in)

	Scenario	2009	2039	2069	2099
Annual Total	CCSM45	53.9	53.4	57.4	56.2
	CCSM85	53.9	55.1	58.5	59.3
	GFDL45	53.9	57.3	63.8	59.0
	GFDL85	53.9	57.8	62.8	63.1
	HAD45	53.9	53.0	57.1	59.4
	HAD85	53.9	58.5	50.2	54.7
Growing Season May—Sep	CCSM45	20.5	20.2	19.9	20.0
	CCSM85	20.5	20.0	18.9	20.0
	GFDL45	20.5	21.9	23.8	22.9
	GFDL85	20.5	22.9	24.7	23.8
	HAD45	20.5	19.4	19.9	19.1
	HAD85	20.5	20.6	14.9	15.5

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
loblolly pine	Pinus taeda	WDH	High	84.3	2903.3	34.4	No change	No change	Medium	Abundant	Good	Good			1	1
shortleaf pine	Pinus echinata	WDH	High	81.9	1678.7	20.5	No change	No change	Medium	Abundant	Good	Good			1	2
white oak	Quercus alba	WDH	Medium	91.6	1044.9	11.4	Sm. dec.	Sm. dec.	High	Abundant	Good	Good			1	3
sweetgum	Liquidambar styraciflua	WDH	High	86.7	735.2	8.5	Sm. inc.	Sm. inc.	Medium	Abundant	Very Good	Very Good			1	4
post oak	Quercus stellata	WDH	High	77.1	453.5	5.9	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	5
black hickory	Carya texana	NDL	High	69.9	316.4	4.5	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	6
winged elm	Ulmus alata	WDL	Medium	83.1	286.3	3.4	Sm. inc.	Lg. inc.	Medium	Common	Good	Very Good			1	7
red maple	Acer rubrum	WDH	High	75.9	262.5	3.5	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good			1	8
southern red oak	Quercus falcata	WDL	Medium	65.1	260.6	4.0	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	9
blackgum	Nyssa sylvatica	WDL	Medium	86.7	237.8	2.7	Sm. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	10
mockernut hickory	Carya alba	WDL	Medium	78.3	211.9	2.7	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	11
northern red oak	Quercus rubra	WDH	Medium	56.6	203.8	3.6	No change	No change	High	Common	Good	Good			1	12
black oak	Quercus velutina	WDH	High	54.2	149.0	2.8	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	13
willow oak	Quercus phellos	NSL	Low	27.7	122.1	4.4	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	14
black cherry	Prunus serotina	WDL	Medium	59	111.4	1.9	Lg. inc.	Lg. inc.	Low	Common	Good	Good			1	15
eastern hophornbeam; ironw	Ostrya virginiana	WSL	Low	51.8	107.0	2.1	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good			1	16
water oak	Quercus nigra	WDH	High	32.5	94.8	2.9	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	17
green ash	Fraxinus pennsylvanica	WSH	Low	49.4	93.7	1.9	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	18
American hornbeam; muscle	Carpinus caroliniana	WSL	Low	39.8	88.5	2.2	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	19
flowering dogwood	Cornus florida	WDL	Medium	60.2	64.1	1.1	Sm. inc.	Lg. inc.	Medium	Common	Good	Very Good			1	20
eastern redcedar	Juniperus virginiana	WDH	Medium	26.5	63.5	2.4	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	21
cherrybark oak; swamp red o	Quercus pagoda	NSL	Medium	21.7	53.6	2.5	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	22
blackjack oak	Quercus marilandica	NSL	Medium	25.3	42.9	1.7	Lg. inc.	Lg. inc.	High	Rare	Good	Good			1	23
river birch	Betula nigra	NSL	Low	4.8	30.2	6.3	Sm. inc.	Sm. inc.	Medium	Rare	Fair	Fair			1	24
hackberry	Celtis occidentalis	WDH	Medium	6	28.9	4.8	No change	No change	High	Rare	Fair	Fair	Infill +	Infill +	1	25
sugarberry	Celtis laevigata	NDH	Medium	16.9	28.7	1.7	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			1	26
American holly	Ilex opaca	NSL	Medium	20.5	27.9	1.4	Sm. inc.	Sm. inc.	Medium	Rare	Fair	Fair			1	27
sycamore	Platanus occidentalis	NSL	Low	9.6	20.9	2.2	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	1	28
bald cypress	Taxodium distichum	NSH	Medium	1.2	20.0	16.6	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			2	29
honeylocust	Gleditsia triacanthos	NSH	Low	6	18.3	3.0	No change	Sm. inc.	High	Rare	Fair	Good			1	30
slippery elm	Ulmus rubra	WSL	Low	14.5	15.4	1.1	Sm. dec.	Sm. inc.	Medium	Rare	Very Poor	Fair			1	31
pignut hickory	Carya glabra	WDL	Medium	6	14.8	2.5	Sm. inc.	Sm. inc.	Medium	Rare	Fair	Fair	Infill +	Infill +	1	32
shagbark hickory	Carya ovata	WSL	Medium	4.8	14.7	3.1	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	1	33
American elm	Ulmus americana	WDH	Medium	13.3	13.8	1.0	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			1	34
Shumard oak	Quercus shumardii	NSL	Low	6	12.3	2.0	No change	No change	High	Rare	Fair	Fair	Infill +	Infill +	1	35
common persimmon	Diospyros virginiana	NSL	Low	7.2	10.9	1.5	Sm. inc.	Lg. inc.	High	Rare	Good	Good			1	36
swamp chestnut oak	Quercus michauxii	NSL	Low	4.8	10.6	2.2	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	37
Nuttall oak	Quercus texana	NSH	Medium	1.2	10.6	8.8	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor			0	38
silver maple	Acer saccharinum	NSH	Low	1.2	10.1	8.4	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor			0	39
black walnut	Juglans nigra	WDH	Low	2.4	9.9	4.1	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	40
boxelder	Acer negundo	WSH	Low	2.4	9.8	4.1	Sm. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	Infill ++	1	41
overcup oak	Quercus lyrata	NSL	Medium	3.6	9.2	2.6	No change	No change	Low	Rare	Very Poor	Very Poor			2	42
chinkapin oak	Quercus muehlenbergii	NSL	Medium	3.6	9.0	2.5	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	43
red mulberry	Morus rubra	NSL	Low	13.3	8.9	0.7	Sm. dec.	Lg. inc.	Medium	Rare	Very Poor	Good			1	44
bitternut hickory	Carya cordiformis	WSL	Low	10.8	8.8	0.8	Lg. dec.	Lg. dec.	High	Rare	Poor	Poor			1	45
white ash	Fraxinus americana	WDL	Medium	7.2	8.2	1.1	Sm. inc.	Sm. inc.	Low	Rare	Poor	Poor	Infill +	Infill +	1	46
American basswood	Tilia americana	WSL	Medium	6	8.0	1.3	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	47

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Common Name	Scientific Name	Range	MR	%Cell	FIAsum	FIAiv	ChngCl45	ChngCl85	Adap	Abund	Capabil45	Capabil85	SHIFT45	SHIFT85	SSO	N
sassafras	Sassafras albidum	WSL	Low	8.4	6.5	0.8	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			1	48
shellbark hickory	Carya laciniosa	NSL	Low	1.2	6.3	5.2	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	49
American beech	Fagus grandifolia	WDH	High	2.4	6.0	2.5	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	50
serviceberry	Amelanchier spp.	NSL	Low	12	5.9	0.5	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	51
eastern redbud	Cercis canadensis	NSL	Low	4.8	5.1	1.1	No change	No change	Medium	Rare	Poor	Poor			1	52
florida maple	Acer barbatum	NSL	Low	2.4	2.0	0.8	Lg. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	Infill ++	2	53
sweetbay	Magnolia virginiana	NSL	Medium	4.8	1.6	0.3	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	2	54
paulownia	Paulownia tomentosa	NSL	FIA	1.2	1.1	0.9	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	55
wild plum	Prunus americana	NSLX	FIA	2.4	0.8	0.3	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	56
cittamwood/gum bumelia	Sideroxylon lanuginosum ssp.	NSL	Low	1.2	0.8	0.6	Lg. inc.	Lg. inc.	High	Rare	Good	Good			2	57
black willow	Salix nigra	NSH	Low	1.2	0.2	0.2	Lg. inc.	Lg. inc.	Low	Rare	Fair	Fair	Infill +	Infill +	2	58
ashe juniper	Juniperus ashei	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			0	59
slash pine	Pinus elliottii	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate ++	3	60
longleaf pine	Pinus palustris	NSH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate ++	Migrate ++	3	61
Virginia pine	Pinus virginiana	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	62
striped maple	Acer pensylvanicum	NSL	Medium	0	0	0	Unknown	New Habitat	Medium	Absent	Unknown	New Habitat			3	63
mountain maple	Acer spicatum	NSL	Low	0	0	0	Unknown	Unknown	High	Absent	Unknown	Unknown			0	64
sweet birch	Betula lenta	NDH	High	0	0	0	Unknown	Unknown	Low	Absent	Unknown	Unknown			0	65
water hickory	Carya aquatica	NSL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate ++	3	66
pecan	Carya illinoinensis	NSH	Low	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat	Likely +	Likely +	3	67
black ash	Fraxinus nigra	WSH	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat			3	68
silverbell	Halesia spp.	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	69
yellow-poplar	Liriodendron tulipifera	WDH	High	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	70
cucumbertree	Magnolia acuminata	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	71
southern magnolia	Magnolia grandiflora	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +	3	72
bigleaf magnolia	Magnolia macrophylla	NSL	Low	0	0	0	Unknown	Unknown	Medium	Modeled	Unknown	Unknown			0	73
swamp tupelo	Nyssa biflora	NDH	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat		Migrate +	3	74
sourwood	Oxydendrum arboreum	NDL	High	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	75
redbay	Persea borbonia	NSL	Low	0	0	0	Unknown	Unknown	High	Modeled	Unknown	Unknown			0	76
water elm	Planera aquatica	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Likely +	Likely +	3	77
pin cherry	Prunus pensylvanica	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	78
scarlet oak	Quercus coccinea	WDL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	79
laurel oak	Quercus laurifolia	NDH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +	3	80
chestnut oak	Quercus prinus	NDH	High	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	81
live oak	Quercus virginiana	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate ++	Migrate ++	3	82
bluejack oak	Quercus incana	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +	3	83
cedar elm	Ulmus crassifolia	NDH	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat	Likely +	Likely +	3	84