National Park

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 8,200.0 3,166.0 229

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								Potential Change in Habitat Suitability			Capability to Cope or Persist			
Ash	2				Model			Scenario	Scenario		Scenario	Scenario		SHIFT	SHIFT
Hickory	7	Abu	ndance		Reliability	Adaptability		RCP45	RCP85		RCP45	RCP85		RCP45	RCP85
Maple	3	Abundant	5	High	21	20	Increase	23	31	Very Good	11	13	Likely	1	2
Oak	13	Common	28	Medium	27	48	No Change	11	9	Good	14	18	Infill	5	9
Pine	5	Rare	33	Low	30	11	Decrease	28	22	Fair	12	11	Migrate	3	4
Other	36	Absent	16	FIA	4		New	12	13	Poor	10	6	·	9	15
•	66		82		82	79	Unknown	8	7	Very Poor	15	12			
							-	82	82	FIA Only	2	2			
										Unknown	4	3			
Potentia	Potential Changes in Climate Variables										60	C.E.			

Potential Changes in Climate Variables

Temperature (°F)												
	Scenario	2009	2039	2069	2099							
Annual	CCSM45	59.9	61.7	63.8	63.9							
Average	CCSM85	59.9	62.1	64.5	67.3							
	GFDL45	59.9	62.8	64.9	65.7							
	GFDL85	59.9	62.8	66.1	69.8							
	HAD45	59.9	62.2	65.2	66.5							
	HAD85	59.9	62.5	66.5	70.7							
Growing	CCSM45	74.0	75.8	77.6	78.1							
Season	CCSM85	74.0	76.0	78.6	82.2							
May—Sep	GFDL45	74.0	77.3	79.5	80.9							
	GFDL85	74.0	77.4	81.0	85.3							
	HAD45	74.0	77.1	79.8	81.4							
	HAD85	74.0	77.0	82.6	86.9							
Coldest	CCSM45	39.2	41.6	42.5	42.5							
Month	CCSM85	39.2	41.8	42.8	43.9							
Average	GFDL45	39.2	42.4	42.7	43.4							
	GFDL85	39.2	41.3	42.3	43.1							
	HAD45	39.2	39.6	41.3	41.7							
	HAD85	39.2	40.3	41.5	43.0							
Warmest	CCSM45	79.1	81.2	82.2	82.2							
Month	CCSM85	79.1	81.4	83.0	84.7							
Average	GFDL45	79.1	82.1	83.1	84.1							
	GFDL85	79.1	82.7	84.6	87.1							
	HAD45	79.1	82.7	84.5	85.2							

89.2

Precipitation (in)													
	Scenario	2009	2039	2069	2099								
Annual	CCSM45	45.3	49.1	51.5	53.0								
Total	CCSM85	45.3	49.6	52.6	58.2								
	GFDL45	45.3	50.7	54.5	57.2								
	GFDL85	45.3	49.6	55.9	55.8								
	HAD45	45.3	46.5	48.9	49.6								
	HAD85	45.3	50.1	46.1	48.5								
Growing	CCSM45	19.0	21.9	23.3	24.5								
Season	CCSM85	19.0	21.3	22.3	24.8								
May—Sep	GFDL45	19.0	23.0	25.6	26.3								
	GFDL85	19.0	21.8	26.6	26.6								
	HAD45	19.0	19.2	19.6	20.4								
	HAD85	19.0	21.9	18.2	18.1								

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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HAD85

79.1

83.3

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Common Name	Scientific Name	Range				FIAiv ChngCl45	ChngCl85	Adap	Abund	Capabil45	Capabil85	SHIFT45	SHIFT85	SSO N
loblolly pine	Pinus taeda	WDH	High	58.5			Sm. inc.	Medium		Very Good	Very Good			1 1
sweetgum	Liquidambar styraciflua		High	87.8		11.3 Sm. inc.	Sm. inc.	Medium		Very Good	Very Good			1 2
yellow-poplar	Liriodendron tulipifera	WDH	High	78	690.0	_	Lg. dec.	High	Abundant	Good	Good			1 3
shortleaf pine	Pinus echinata		High	69.5	579.9		Sm. inc.	Medium		Very Good	Very Good			1 4
Virginia pine	Pinus virginiana	NDH	High	58.5	534.4	, and the second	Lg. dec.	Medium	Abundant	Fair	Fair			0 5
red maple	Acer rubrum	WDH	High	84.1	477.7		No change	High	Common	Good	Good			1 6
white oak	Quercus alba	WDH	Medium	67.1	454.9		No change	High	Common	Good	Good			1 7
black cherry	Prunus serotina	WDL	Medium	70.7	362.2		No change	Low	Common	Poor	Poor			0 8
water oak	Quercus nigra	WDH	High	57.3	350.2	•	Lg. inc.		Common	Very Good	Very Good			1 9
eastern redcedar	Juniperus virginiana		Medium	70.7	306.5	4.6 Sm. inc.	Lg. inc.	Medium	Common	Good	Very Good			1 10
southern red oak	Quercus falcata	WDL	Medium	62.2	244.7	4.2 Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			1 11
northern red oak	Quercus rubra	WDH	Medium	52.4	238.4	5.0 Sm. dec.	Sm. dec.	High	Common	Fair	Fair			1 12
sourwood	Oxydendrum arboreum	NDL	High	54.9	204.3	4.0 Sm. dec.	Sm. dec.	High	Common	Fair	Fair			1 13
river birch	Betula nigra	NSL	Low	13.4	162.0	12.1 No change	Sm. inc.	Medium	Common	Fair	Good			1 14
chestnut oak	Quercus prinus	NDH	High	17.1	160.1	9.4 Lg. dec.	Lg. dec.	High	Common	Fair	Fair			1 15
mockernut hickory	Carya alba	WDL	Medium	54.9	139.5	2.8 Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			1 16
scarlet oak	Quercus coccinea	WDL	Medium	29.3	127.0	4.3 Sm. dec.	Lg. dec.	Medium	Common	Poor	Poor			0 17
willow oak	Quercus phellos	NSL	Low	31.7	123.1	3.9 Sm. dec.	Sm. dec.	Medium	Common	Poor	Poor			0 18
American beech	Fagus grandifolia	WDH	High	39	115.6	3.3 No change	Sm. inc.	Medium	Common	Fair	Good			1 19
winged elm	Ulmus alata	WDL	Medium	42.7	115.2	2.7 Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1 20
flowering dogwood	Cornus florida	WDL	Medium	63.4	114.2	2.0 No change	No change	Medium	Common	Fair	Fair			1 21
American hornbeam; mu	scle\ Carpinus caroliniana	WSL	Low	28	111.3	4.0 No change	Sm. inc.	Medium	Common	Fair	Good			1 22
green ash	Fraxinus pennsylvanica	WSH	Low	24.4	99.7	4.1 Sm. inc.	Lg. inc.	Medium	Common	Good	Very Good			1 23
pignut hickory	Carya glabra	WDL	Medium	43.9	93.7	2.4 Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1 24
blackgum	Nyssa sylvatica	WDL	Medium	54.9	92.6	1.8 Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			1 25
post oak	Quercus stellata	WDH	High	37.8	86.6	2.6 Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			1 26
black oak	Quercus velutina	WDH	High	37.8	79.6	2.4 Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1 27
sycamore	Platanus occidentalis	NSL	Low	17.1	69.2	4.1 Sm. dec.	Sm. inc.	Medium	Common	Poor	Good			1 28
white ash	Fraxinus americana	WDL	Medium	31.7	62.8	2.3 Sm. inc.	Lg. inc.	Low	Common	Fair	Good			1 29
pecan	Carya illinoinensis	NSH	Low	1.2	61.0	50.0 Sm. dec.	No change	Low	Common	Poor	Poor		Infill +	0 30
common persimmon	Diospyros virginiana	NSL	Low	25.6	57.7	2.7 Lg. dec.	Lg. dec.	High	Common	Fair	Fair			1 31
American elm	Ulmus americana	WDH	Medium	23.2	55.6	2.9 Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1 32
black willow	Salix nigra	NSH	Low	4.9	53.3	10.9 No change	No change	Low	Common	Poor	Poor		Infill +	0 33
ailanthus	Ailanthus altissima	NSL	FIA	4.9	41.2	8.5 Unknown	Unknown	NA	Rare	NNIS	NNIS			0 34
American holly	llex opaca	NSL	Medium	26.8	35.9	1.3 No change	Sm. inc.	Medium	Rare	Poor	Fair			1 35
shagbark hickory	Carya ovata	WSL	Medium	9.8	28.6	2.9 Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0 36
pitch pine	Pinus rigida	NSH	High	2.4	27.6	11.3 Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0 37
florida maple	Acer barbatum	NSL	Low	12.2	27.4	2.3 Sm. inc.	Lg. inc.	High	Rare	Good	Good			1 38
eastern cottonwood	Populus deltoides	NSH	Low	3.7	25.6	7.0 Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0 39
slippery elm	Ulmus rubra	WSL	Low	15.9	24.9	2.2 Lg. dec.	No change	Medium	Rare	Very Poor	Poor			1 40
black locust	Robinia pseudoacacia	NDH	Low	6.1	24.3	4.0 Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0 41
eastern white pine	Pinus strobus	WDH	High	4.9	21.6	4.4 Sm. dec.	Sm. dec.	Low	Rare	Very Poor	Very Poor			2 42
sand hickory	Carya pallida	NSL	FIA	12.2	19.6	1.6 Unknown	Unknown	NA	Rare	FIA Only	FIA Only			0 43
blackjack oak	Quercus marilandica	NSL	Medium	3.7	19.2	5.2 Lg. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	Infill ++	2 44
eastern redbud	Cercis canadensis	NSL	Low	14.6	16.0	_	Sm. inc.	Medium	Rare	Very Poor	Fair			1 45
black walnut	Juglans nigra	WDH	Low	13.4	15.6		Lg. dec.	Medium		Very Poor	Very Poor			0 46
boxelder	Acer negundo	WSH	Low	3.7	14.8		No change	High	Rare	Poor	Fair		Infill +	1 47
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Common Name	Scientific Name	Range	MR	%Cell	FIAsum	FIAiv	ChngCl45	ChngCl85	Adap	Abund	Capabil45	Capabil85	SHIFT45	SHIFT85	SSO N
honeylocust	Gleditsia triacanthos	NSH	Low	2.4	10.9	4.5	No change	Sm. inc.	High	Rare	Fair	Good		Infill ++	2 48
laurel oak	Quercus laurifolia	NDH	Medium	6.1	10.8	1.8	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++		1 49
sugarberry	Celtis laevigata	NDH	Medium	4.9	8.7	1.8	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	2 50
red mulberry	Morus rubra	NSL	Low	4.9	7.2	1.5	No change	Sm. inc.	Medium	Rare	Poor	Fair			1 51
bitternut hickory	Carya cordiformis	WSL	Low	4.9	6.1	1.3	Lg. dec.	Very Lg. dec.	High	Rare	Poor	Lost			0 52
hackberry	Celtis occidentalis	WDH	Medium	2.4	6.0	2.4	No change	No change	High	Rare	Fair	Fair	Infill +	Infill +	2 53
sassafras	Sassafras albidum	WSL	Low	4.9	4.1	0.8	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good		Infill ++	1 54
American basswood	Tilia americana	WSL	Medium	3.7	4.1	1.1	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0 55
silverbell	Halesia spp.	NSL	Low	2.4	2.6	1.1	Sm. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0 56
eastern hophornbeam; ironv	v Ostrya virginiana	WSL	Low	3.7	2.3	0.6	Lg. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	Infill ++	2 57
shellbark hickory	Carya laciniosa	NSL	Low	1.2	2.2	1.8	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0 58
cucumbertree	Magnolia acuminata	NSL	Low	1.2	1.3	1.1	Lg. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0 59
cherrybark oak; swamp red o	Quercus pagoda	NSL	Medium	1.2	0.9	0.7	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2 60
white mulberry	Morus alba	NSL	FIA	1.2	0.7	0.6	Unknown	Unknown	NA	Rare	NNIS	NNIS			0 61
pawpaw	Asimina triloba	NSL	Low	1.2	0.7	0.5	Lg. dec.	Very Lg. dec.	Medium	Rare	Very Poor	Lost			0 62
mountain or Fraser magnolia	Magnolia fraseri	NSL	Low	1.2	0.5	0.4	Lg. dec.	Lg. dec.	Low	Rare	Very Poor	Very Poor			0 63
serviceberry	Amelanchier spp.	NSL	Low	1.2	0.4	0.4	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0 64
American chestnut	Castanea dentata	NSLX	FIA	1.2	0.4	0.3	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0 65
bluejack oak	Quercus incana	NSL	Low	1.2	0.3	0.3	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2 66
ashe juniper	Juniperus ashei	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			0 67
slash pine	Pinus elliottii	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate ++	3 68
longleaf pine	Pinus palustris	NSH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3 69
eastern hemlock	Tsuga canadensis	NSH	High	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat	Likely +	Likely +	3 70
striped maple	Acer pensylvanicum	NSL	Medium	0	0	0	Unknown	New Habitat	Medium	Absent	Unknown	New Habitat		Likely +	3 71
sugar maple	Acer saccharum	WDH	High	0	0	0	Unknown	Unknown	High	Absent	Unknown	Unknown			0 72
yellow buckeye	Aesculus flava	NSL	Low	0	0	0	Unknown	Unknown	Low	Absent	Unknown	Unknown			0 73
yellow birch	Betula alleghaniensis	NDL	High	0	0	0	Unknown	Unknown	Medium	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
black hickory	Carya texana	NDL	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3 76
black ash	Fraxinus nigra	WSH	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat			3 77
southern magnolia	Magnolia grandiflora	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3 78
sweetbay	Magnolia virginiana	NSL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3 79
swamp tupelo	Nyssa biflora	NDH	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat			3 80
live oak	Quercus virginiana	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate ++	3 81
cedar elm	Ulmus crassifolia	NDH	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat			0 82

