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National Forests and Grasslands
Climate Change Atlas Tree Species
Current and Potential Future Habitat, Capability, and Migration

USDA Forest Service
Northern Research Station
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Iverson, Peters, Prasad, Matthews

	sq. km	sq. mi	FIA Plots
Area of Region	9,100.0	3,513.5	114

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	3
Hickory	7
Maple	1
Oak	12
Pine	2
Other	21
	46

Abundance	
Abundant	0
Common	12
Rare	34
Absent	5
	51

	Model Reliability	Adaptability
High	9	14
Medium	21	30
Low	20	6
FIA	1	
	51	**50**

Potential Change in Habitat Suitability	Scenario RCP45	Scenario RCP85
Increase	11	16
No Change	15	11
Decrease	19	18
New	3	3
Unknown	3	3
	51	**51**

Capability to Cope or Persist	Scenario RCP45	Scenario RCP85
Very Good	0	1
Good	12	14
Fair	10	7
Poor	8	10
Very Poor	14	12
FIA Only	1	1
Unknown	2	2
	47	**47**

Migration Potential	SHIFT RCP45	SHIFT RCP85
Likely	2	2
Infill	12	12
Migrate	0	0
	14	**14**

Potential Changes in Climate Variables

Temperature (°F)

	Scenario	2009	2039	2069	2099
Annual Average	CCSM45	63.3	64.8	66.4	66.9
	CCSM85	63.3	65.5	67.7	70.3
	GFDL45	63.3	68.2	67.7	69.1
	GFDL85	63.3	66.1	69.0	72.6
	HAD45	63.3	65.4	68.2	69.2
	HAD85	63.3	65.8	69.9	73.3
Growing Season May—Sep	CCSM45	78.0	79.3	80.8	81.4
	CCSM85	78.0	80.5	82.5	85.7
	GFDL45	78.0	84.4	83.1	85.7
	GFDL85	78.0	81.8	85.1	89.7
	HAD45	78.0	80.4	83.0	83.6
	HAD85	78.0	80.9	85.9	88.8
Coldest Month Average	CCSM45	41.1	43.3	44.1	44.4
	CCSM85	41.1	43.4	44.5	45.9
	GFDL45	41.1	44.6	44.8	44.9
	GFDL85	41.1	42.1	43.6	44.1
	HAD45	41.1	41.6	43.7	44.0
	HAD85	41.1	43.7	45.5	47.2
Warmest Month Average	CCSM45	83.8	84.9	85.6	85.8
	CCSM85	83.8	86.1	86.7	88.5
	GFDL45	83.8	89.0	89.2	91.1
	GFDL85	83.8	88.6	90.3	94.0
	HAD45	83.8	86.4	87.7	87.9
	HAD85	83.8	87.3	89.8	90.7

Precipitation (in)

	Scenario	2009	2039	2069	2099
Annual Total	CCSM45	44.3	45.2	45.7	45.2
	CCSM85	44.3	43.4	46.4	45.8
	GFDL45	44.3	46.0	52.2	45.0
	GFDL85	44.3	46.0	49.7	49.2
	HAD45	44.3	45.1	45.2	47.9
	HAD85	44.3	48.0	41.4	44.8
Growing Season May—Sep	CCSM45	18.5	19.8	17.9	18.8
	CCSM85	18.5	18.1	17.3	17.2
	GFDL45	18.5	19.8	23.1	19.7
	GFDL85	18.5	20.4	22.0	20.9
	HAD45	18.5	18.2	17.6	18.6
	HAD85	18.5	19.1	14.4	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
post oak	Quercus stellata	WDH	High	51.6	384.1	24.0	No change	No change	High	Common	Good	Good			1	1
eastern redcedar	Juniperus virginiana	WDH	Medium	81.3	275.3	14.2	No change	No change	Medium	Common	Fair	Fair			1	2
winged elm	Ulmus alata	WDL	Medium	61.5	264.3	11.7	No change	No change	Medium	Common	Fair	Fair			1	3
Osage-orange	Maclura pomifera	NDH	Medium	64.8	241.3	12.6	No change	No change	High	Common	Good	Good			1	4
sugarberry	Celtis laevigata	NDH	Medium	70.3	218.9	15.9	No change	Sm. inc.	Medium	Common	Fair	Good			1	5
honeylocust	Gleditsia triacanthos	NSH	Low	52.7	203.5	14.7	Sm. dec.	Sm. dec.	High	Common	Fair	Fair			1	6
green ash	Fraxinus pennsylvanica	WSH	Low	63.7	202.1	9.9	No change	No change	Medium	Common	Fair	Fair			1	7
pecan	Carya illinoinensis	NSH	Low	39.6	171.4	12.4	No change	No change	Low	Common	Poor	Poor			0	8
water oak	Quercus nigra	WDH	High	41.8	162.7	11.1	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	9
cedar elm	Ulmus crassifolia	NDH	Medium	45.1	133.0	11.7	Lg. inc.	Lg. inc.	Low	Common	Good	Good			1	10
blackjack oak	Quercus marilandica	NSL	Medium	28.6	116.9	10.3	No change	Sm. inc.	High	Common	Good	Very Good	Infill ++	Infill ++	1	11
southern red oak	Quercus falcata	WDL	Medium	33	92.8	8.7	Sm. dec.	Sm. dec.	High	Common	Fair	Fair	Infill +	Infill +	1	12
American elm	Ulmus americana	WDH	Medium	50.5	49.1	5.5	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			1	13
Shumard oak	Quercus shumardii	NSL	Low	26.4	40.6	4.4	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor	Infill +	Infill +	1	14
black hickory	Carya texana	NDL	High	8.8	36.3	7.4	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	1	15
boxelder	Acer negundo	WSH	Low	26.4	35.0	6.8	No change	Sm. inc.	High	Rare	Fair	Good			1	16
sycamore	Platanus occidentalis	NSL	Low	11	32.9	12.9	Sm. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			2	17
white ash	Fraxinus americana	WDL	Medium	13.2	32.6	5.4	Sm. inc.	Sm. inc.	Low	Rare	Poor	Poor	Infill +	Infill +	1	18
common persimmon	Diospyros virginiana	NSL	Low	38.5	23.8	4.3	No change	Sm. inc.	High	Rare	Fair	Good			1	19
mockernut hickory	Carya alba	WDL	Medium	14.3	21.7	4.0	Lg. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	Infill ++	1	20
black willow	Salix nigra	NSH	Low	23.1	21.2	10.4	No change	Sm. inc.	Low	Rare	Very Poor	Poor			1	21
bur oak	Quercus macrocarpa	NDH	Medium	9.9	18.6	6.0	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor			0	22
bitternut hickory	Carya cordiformis	WSL	Low	12.1	17.9	3.8	Lg. dec.	Lg. dec.	High	Rare	Poor	Poor			0	23
cittamwood/gum bumelia	Sideroxylon lanuginosum ssp.	NSL	Low	27.5	17.8	2.9	Lg. inc.	Lg. inc.	High	Rare	Good	Good			1	24
hackberry	Celtis occidentalis	WDH	Medium	9.9	14.8	5.4	No change	No change	High	Rare	Fair	Fair	Infill +	Infill +	1	25
black oak	Quercus velutina	WDH	High	12.1	14.0	4.5	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			2	26
red mulberry	Morus rubra	NSL	Low	34.1	11.4	1.9	Sm. dec.	No change	Medium	Rare	Very Poor	Poor			1	27
eastern redbud	Cercis canadensis	NSL	Low	18.7	10.9	1.8	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	28
black walnut	Juglans nigra	WDH	Low	5.5	10.4	5.1	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	29
chinkapin oak	Quercus muehlenbergii	NSL	Medium	2.2	9.9	4.5	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	30
flowering dogwood	Cornus florida	WDL	Medium	3.3	6.7	2.0	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	31
Texas ash	Fraxinus texensis	NDH	FIA	9.9	6.0	4.7	Unknown	Unknown	NA	Rare	FIA Only	FIA Only			0	32
eastern cottonwood	Populus deltoides	NSH	Low	14.3	5.2	2.8	Sm. inc.	Sm. inc.	Medium	Rare	Fair	Fair	Infill +	Infill +	2	33
slippery elm	Ulmus rubra	WSL	Low	22	5.1	3.7	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	1	34
river birch	Betula nigra	NSL	Low	5.5	4.3	2.7	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	35
sassafras	Sassafras albidum	WSL	Low	1.1	4.2	3.8	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	36
pignut hickory	Carya glabra	WDL	Medium	1.1	2.3	2.1	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	37
black cherry	Prunus serotina	WDL	Medium	14.3	2.1	1.3	Sm. dec.	Sm. dec.	Low	Rare	Very Poor	Very Poor			0	38
shortleaf pine	Pinus echinata	WDH	High	8.8	1.6	2.9	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	2	39
willow oak	Quercus phellos	NSL	Low	8.8	1.2	2.1	No change	No change	Medium	Rare	Poor	Poor	Infill +		2	40
shagbark hickory	Carya ovata	WSL	Medium	5.5	0.9	0.7	Very Lg. dec.	Very Lg. dec.	Medium	Rare	Lost	Lost			0	41
water hickory	Carya aquatica	NSL	Medium	4.4	0.5	1.8	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	42
cherrybark oak; swamp red o	Quercus pagoda	NSL	Medium	4.4	0.4	1.6	No change	No change	Medium	Rare	Poor	Poor		Infill +	2	43
live oak	Quercus virginiana	NDH	High	4.4	0.3	1.1	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	44
overcup oak	Quercus lyrata	NSL	Medium	4.4	0.3	1.0	Lg. dec.	Lg. dec.	Low	Rare	Very Poor	Very Poor			0	45
loblolly pine	Pinus taeda	WDH	High	4.4	0.2	0.9	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	2	46
ashe juniper	Juniperus ashei	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			0	47

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American holly	Ilex opaca	NSL	Medium	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	48
sweetgum	Liquidambar styraciflua	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Likely +	Likely +	3	49
eastern hophornbeam; ironw	Ostrya virginiana	WSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Likely +	Likely +	3	50
pin cherry	Prunus pensylvanica	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	51