

HUC 060300 Middle Tennessee-Elk

HUC 6 Watershed 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 26,844 10,364 646

Species Information

The columns below provide brief 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			Migration Potential		
					Model		Scenario	Scenario		Scenario	Scenario		SHIFT	SHIFT	
			Abundance		Reliability	Adaptability	RCP45	RCP85		RCP45	RCP85		RCP45	RCP85	
Ash	3			High	21	29	Increase	30	36	Very Good	16	21	Likely	1	1
Hickory	8			Medium	36	55	No Change	14	10	Good	15	14	Infill	15	14
Maple	5	Abundant	4	Low	41	17	Decrease	37	35	Fair	13	12	igrate	4	5
Oak	17	Common	39	FIA	7		New	11	11	Poor	16	14		20	20
Pine	5	Rare	45				Unknown	13	13	Very Poor	20	18			
Other	50	Absent	14					105	105	FIA Only	4	4			
	88		102		105	101				Unknown	6	6			
Potential Changes in Climate Variables															

Potential Changes in Climate Variables

Temperature (°F)

	Scenario	2009	2039	2069	2099	
Annual Average	CCSM45	54.6	56.0	57.9	58.0	
	CCSM85	54.6	56.4	58.5	60.7	
	GFDL45	54.6	56.8	58.5	59.2	
	GFDL85	54.6	56.7	59.4	62.2	
	HAD45	54.6	56.6	59.1	60.2	
	HAD85	54.6	56.9	60.6	63.7	
Growing Season May—Sep	CCSM45	66.4	67.7	69.3	69.8	
	CCSM85	66.4	68.0	70.2	73.1	
	GFDL45	66.4	68.9	70.7	71.9	
	GFDL85	66.4	68.7	71.9	75.2	
	HAD45	66.4	69.2	71.5	72.7	
	HAD85	66.4	69.3	74.7	77.5	
Coldest Month Average	CCSM45	36.7	38.5	39.4	39.5	
	CCSM85	36.7	39.1	40.0	41.1	
	GFDL45	36.7	39.7	39.7	40.0	
	GFDL85	36.7	38.1	39.1	39.4	
	HAD45	36.7	36.8	38.5	38.9	
	HAD85	36.7	37.9	39.1	40.4	
Warmest Month Average	CCSM45	70.4	71.7	72.5	72.6	
	CCSM85	70.4	71.9	73.2	74.7	
	GFDL45	70.4	73.0	73.9	74.7	
	GFDL85	70.4	72.9	74.7	76.3	
	HAD45	70.4	74.1	76.1	76.5	
	HAD85	70.4	74.8	78.6	79.6	

Precipitation (in)

	Scenario	2009	2039	2069	2099	
Annual Total	CCSM45	46.3	48.1	51.8	50.3	
	CCSM85	46.3	49.7	50.6	55.2	
	GFDL45	46.3	52.5	54.8	57.5	
	GFDL85	46.3	52.6	55.0	57.9	
	HAD45	46.3	44.1	49.1	49.6	
	HAD85	46.3	47.3	42.9	47.5	
Growing Season May—Sep	CCSM45	18.0	17.8	18.1	18.6	
	CCSM85	18.0	17.9	17.1	18.8	
	GFDL45	18.0	21.3	22.2	22.7	
	GFDL85	18.0	21.7	22.8	23.8	
	HAD45	18.0	16.7	17.8	17.1	
	HAD85	18.0	18.2	13.4	15.0	

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	51.1	1137.7	18.3	Lg. inc.	Lg. inc.	Medium	Abundant	Very Good	Very Good			1	1
white oak	Quercus alba	WDH	Medium	63.5	651.3	8.3	No change	No change	High	Abundant	Very Good	Very Good			1	2
sweetgum	Liquidambar styraciflua	WDH	High	63.8	637.7	9.4	Sm. inc.	Sm. inc.	Medium	Abundant	Very Good	Very Good			1	3
yellow-poplar	Liriodendron tulipifera	WDH	High	60.5	602.0	7.7	Sm. dec.	Lg. dec.	High	Abundant	Good	Good			1	4
chestnut oak	Quercus prinus	NDH	High	37.2	399.7	7.9	Sm. dec.	Sm. dec.	High	Common	Fair	Fair			1	5
pignut hickory	Carya glabra	WDL	Medium	64.7	347.1	4.7	Sm. dec.	Lg. dec.	Medium	Common	Poor	Poor			0	6
eastern redcedar	Juniperus virginiana	WDH	Medium	50.5	322.0	6.4	Sm. inc.	Lg. inc.	Medium	Common	Good	Very Good			1	7
red maple	Acer rubrum	WDH	High	54	310.5	4.6	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good			1	8
southern red oak	Quercus falcata	WDL	Medium	40.8	262.5	5.4	Sm. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	9
mockernut hickory	Carya alba	WDL	Medium	50.4	258.2	4.1	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good			1	10
Virginia pine	Pinus virginiana	NDH	High	23.7	257.3	8.2	No change	Sm. dec.	Medium	Common	Fair	Poor			1	11
shagbark hickory	Carya ovata	WSL	Medium	41.4	231.7	5.3	Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor			0	12
black cherry	Prunus serotina	WDL	Medium	57.3	225.0	3.5	No change	Sm. inc.	Low	Common	Poor	Fair			1	13
blackgum	Nyssa sylvatica	WDL	Medium	55.4	215.0	3.0	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good			1	14
winged elm	Ulmus alata	WDL	Medium	56	214.2	3.9	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	15
post oak	Quercus stellata	WDH	High	41.5	211.7	3.9	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	16
scarlet oak	Quercus coccinea	WDL	Medium	40.7	202.4	4.1	Sm. dec.	Lg. dec.	Medium	Common	Poor	Poor			0	17
white ash	Fraxinus americana	WDL	Medium	34.9	167.1	4.6	No change	No change	Low	Common	Poor	Poor			0	18
northern red oak	Quercus rubra	WDH	Medium	38.2	155.5	4.0	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good			1	19
sourwood	Oxydendrum arboreum	NDL	High	38.6	155.0	3.0	Sm. dec.	Sm. dec.	High	Common	Fair	Fair			1	20
shortleaf pine	Pinus echinata	WDH	High	25.1	152.4	4.6	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	21
black oak	Quercus velutina	WDH	High	40.6	151.6	3.1	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	22
hackberry	Celtis occidentalis	WDH	Medium	23.9	144.8	6.1	No change	Sm. inc.	High	Common	Good	Very Good			1	23
sugarberry	Celtis laevigata	NDH	Medium	24.3	137.4	6.6	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	24
sugar maple	Acer saccharum	WDH	High	25.7	136.5	4.4	Lg. dec.	Lg. dec.	High	Common	Fair	Fair	Infill +		1	25
chinkapin oak	Quercus muehlenbergii	NSL	Medium	31	136.3	4.4	Sm. dec.	Sm. dec.	Medium	Common	Poor	Poor			0	26
green ash	Fraxinus pennsylvanica	WSH	Low	38.5	134.6	3.6	Sm. inc.	Lg. inc.	Medium	Common	Good	Very Good			1	27
sassafras	Sassafras albidum	WSL	Low	40.2	132.5	3.4	Sm. dec.	No change	Medium	Common	Poor	Fair			1	28
flowering dogwood	Cornus florida	WDL	Medium	42.3	104.5	2.0	No change	Sm. inc.	Medium	Common	Fair	Good			1	29
water oak	Quercus nigra	WDH	High	23.4	102.2	4.3	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	30
florida maple	Acer barbatum	NSL	Low	22.5	89.1	4.2	Sm. dec.	Sm. dec.	High	Common	Fair	Fair			1	31
American beech	Fagus grandifolia	WDH	High	23	86.1	2.5	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	32
common persimmon	Diospyros virginiana	NSL	Low	34.3	84.9	2.0	No change	Sm. inc.	High	Common	Good	Very Good			1	33
boxelder	Acer negundo	WSH	Low	16.8	83.9	5.4	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good			1	34
black walnut	Juglans nigra	WDH	Low	23.4	78.2	3.8	Sm. dec.	Sm. dec.	Medium	Common	Poor	Poor			0	35
American elm	Ulmus americana	WDH	Medium	30	74.1	2.5	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	36
willow oak	Quercus phellos	NSL	Low	11.7	73.3	5.8	Sm. dec.	No change	Medium	Common	Poor	Fair	Infill +	Infill +	1	37
eastern hophornbeam; ironw	Ostrya virginiana	WSL	Low	33.3	68.7	2.0	Sm. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	38
black locust	Robinia pseudoacacia	NDH	Low	17.1	62.4	3.5	Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor			0	39
cherrybark oak; swamp red o	Quercus pagoda	NSL	Medium	13.1	60.0	4.3	Sm. inc.	Lg. inc.	Medium	Common	Good	Very Good			1	40
Osage-orange	Maclura pomifera	NDH	Medium	6.2	58.7	9.3	No change	No change	High	Common	Good	Good	Infill ++	Infill ++	2	41
sycamore	Platanus occidentalis	NSL	Low	10	51.7	4.5	No change	No change	Medium	Common	Fair	Fair	Infill +	Infill +	1	42
black willow	Salix nigra	NSH	Low	6.6	51.4	8.6	No change	No change	Low	Common	Poor	Poor	Infill +	Infill +	0	43
eastern redbud	Cercis canadensis	NSL	Low	25.4	42.5	1.7	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	44
bitternut hickory	Carya cordiformis	WSL	Low	9.1	37.8	4.1	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor	Infill +	Infill +	1	45
American hornbeam; musclev	Carpinus caroliniana	WSL	Low	17.2	28.1	1.5	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			1	46
honeylocust	Gleditsia triacanthos	NSH	Low	9.2	26.7	3.1	No change	Sm. inc.	High	Rare	Fair	Good	Infill +	Infill ++	1	47

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ailanthus	Ailanthus altissima	NSL	FIA	8.7	25.6	3.6	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	48
slippery elm	Ulmus rubra	WSL	Low	18.5	25.2	1.7	Sm. inc.	Lg. inc.	Medium	Rare	Fair	Good			1	49
American basswood	Tilia americana	WSL	Medium	6.8	25.0	2.9	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	50
red mulberry	Morus rubra	NSL	Low	11.1	20.2	2.0	Lg. dec.	No change	Medium	Rare	Very Poor	Poor			1	51
eastern hemlock	Tsuga canadensis	NSH	High	0.9	19.1	2.2	Sm. dec.	Sm. dec.	Low	Rare	Very Poor	Very Poor			2	52
Shumard oak	Quercus shumardii	NSL	Low	3.7	18.0	4.3	No change	No change	High	Rare	Fair	Fair	Infill +	Infill +	2	53
paulownia	Paulownia tomentosa	NSL	FIA	3.4	13.3	4.0	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	54
yellow buckeye	Aesculus flava	NSL	Low	8.5	12.4	2.1	Sm. dec.	Sm. dec.	Low	Rare	Very Poor	Very Poor			0	55
river birch	Betula nigra	NSL	Low	3	11.1	4.9	Sm. inc.	Lg. inc.	Medium	Rare	Fair	Good	Infill +	Infill ++	1	56
cucumbertree	Magnolia acuminata	NSL	Low	4.3	9.0	1.8	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	57
water tupelo	Nyssa aquatica	NSH	Medium	0.7	8.6	11.4	Sm. dec.	Sm. dec.	Low	Rare	Very Poor	Very Poor			0	58
eastern white pine	Pinus strobus	WDH	High	1.9	7.2	13.7	Sm. dec.	Sm. dec.	Low	Rare	Very Poor	Very Poor			2	59
blackjack oak	Quercus marilandica	NSL	Medium	5	6.9	1.0	Lg. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	Infill ++	2	60
bigleaf magnolia	Magnolia macrophylla	NSL	Low	2.8	6.9	1.1	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			2	61
butternut	Juglans cinerea	NSLX	FIA	3	6.5	2.2	Unknown	Unknown	Low	Rare	FIA Only	FIA Only			0	62
serviceberry	Amelanchier spp.	NSL	Low	4	6.4	1.1	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	63
shellbark hickory	Carya laciniosa	NSL	Low	3.9	6.3	2.0	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	64
sweetbay	Magnolia virginiana	NSL	Medium	0.8	5.0	3.9	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	65
overcup oak	Quercus lyrata	NSL	Medium	1.1	4.8	4.3	Lg. dec.	Sm. dec.	Low	Rare	Very Poor	Very Poor			2	66
Nuttall oak	Quercus texana	NSH	Medium	0.4	4.0	10.7	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor			0	67
sand hickory	Carya pallida	NSL	FIA	0.7	3.4	4.5	Unknown	Unknown	NA	Rare	FIA Only	FIA Only			0	68
white mulberry	Morus alba	NSL	FIA	0.8	3.3	1.7	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	69
blue ash	Fraxinus quadrangulata	NSL	Low	1.6	2.4	0.9	Sm. dec.	Sm. dec.	Low	Rare	Very Poor	Very Poor			0	70
American holly	Ilex opaca	NSL	Medium	1.6	2.2	0.7	No change	Sm. inc.	Medium	Rare	Poor	Fair	Infill +	Infill +	2	71
pin cherry	Prunus pensylvanica	NSL	Low	0.6	2.2	2.7	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	72
bald cypress	Taxodium distichum	NSH	Medium	0.4	2.1	5.6	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	73
silver maple	Acer saccharinum	NSH	Low	2.7	2.0	1.4	Sm. dec.	Lg. dec.	High	Rare	Poor	Poor			0	74
pawpaw	Asimina triloba	NSL	Low	1.8	1.8	1.0	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	75
laurel oak	Quercus laurifolia	NDH	Medium	3.3	1.8	1.3	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	2	76
sweet birch	Betula lenta	NDH	High	0.4	1.5	1.6	Sm. dec.	Sm. dec.	Low	Rare	Very Poor	Very Poor			0	77
swamp chestnut oak	Quercus michauxii	NSL	Low	2.5	1.4	0.9	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			2	78
eastern cottonwood	Populus deltoides	NSH	Low	0.2	0.4	0.6	Lg. dec.	Very Lg. dec.	Medium	Rare	Very Poor	Lost			0	79
wild plum	Prunus americana	NSLX	FIA	3.4	0.4	0.9	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	80
cittamwood/gum bumelia	Sideroxylon lanuginosum ssp.	NSL	Low	0.4	0.4	1.1	Lg. inc.	Lg. inc.	High	Rare	Good	Good			2	81
Ohio buckeye	Aesculus glabra	NSL	Low	0.4	0.4	1.0	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	82
swamp tupelo	Nyssa biflora	NDH	Medium	0.4	0.4	1.0	Lg. inc.	Lg. inc.	Low	Rare	Fair	Fair	Infill +	Infill +	2	83
water hickory	Carya aquatica	NSL	Medium	0.4	0.3	0.2	Very Lg. dec.	Very Lg. dec.	Medium	Rare	Lost	Lost			0	84
rock elm	Ulmus thomasii	NSLX	FIA	0.4	0.3	0.7	Unknown	Unknown	Low	Rare	FIA Only	FIA Only			0	85
yellow birch	Betula alleghaniensis	NDL	High	0.3	0.2	0.5	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	86
slash pine	Pinus elliotii	NDH	High	0.1	0.2	0.2	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	87
pecan	Carya illinoensis	NSH	Low	1.5	0.1	1.1	Lg. inc.	Lg. inc.	Low	Rare	Fair	Fair	Infill +	Infill +	2	88
ashe juniper	Juniperus ashei	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			0	89
longleaf pine	Pinus palustris	NSH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Likely +	Likely +	3	90
Table Mountain pine	Pinus pungens	NSL	Low	0	0	0	Unknown	Unknown	High	Absent	Unknown	Unknown			0	91
black maple	Acer nigrum	NSH	Low	0	0	0	Unknown	Unknown	High	Modeled	Unknown	Unknown			0	92
striped maple	Acer pensylvanicum	NSL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	93
mountain maple	Acer spicatum	NSL	Low	0	0	0	Unknown	Unknown	High	Absent	Unknown	Unknown			0	94

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black hickory	Carya texana	NDL	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	95
black ash	Fraxinus nigra	WSH	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat			3	96
silverbell	Halesia spp.	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	97
southern magnolia	Magnolia grandiflora	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	98
mountain or Fraser magnolia	Magnolia fraseri	NSL	Low	0	0	0	Unknown	Unknown	Low	Absent	Unknown	Unknown			0	99
water elm	Planera aquatica	NSL	Low	0	0	0	Unknown	Unknown	Medium	Modeled	Unknown	Unknown			0	100
turkey oak	Quercus laevis	NSH	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			3	101
bur oak	Quercus macrocarpa	NDH	Medium	0	0	0	Unknown	Unknown	High	Modeled	Unknown	Unknown			0	102
live oak	Quercus virginiana	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate ++	Migrate ++	3	103
bluejack oak	Quercus incana	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +	3	104
cedar elm	Ulmus crassifolia	NDH	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat	Migrate +	Migrate ++	3	105