

# HUC 060102 Upper Tennessee

## HUC 6 Watershed Climate Change Atlas Tree Species

USDA Forest Service  
Northern Research Station  
Landscape Change Research Group  
Iverson, Peters, Prasad, Matthews

### Current and Potential Future Habitat, Capability, and Migration

	sq. km	sq. mi	FIA Plots
Area of Region	21,742	8,394.7	640

#### 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	Abundance		Model		Potential Change in Habitat Suitability		Capability to Cope or Persist		Migration Potential					
				Reliability	Adaptability	Scenario	Scenario	Scenario	Scenario	SHIFT	SHIFT				
				High	24	26	Increase	26	31	Very Good	11	14	Likely	0	0
Ash	3			Medium	32	59	No Change	28	24	Good	16	15	Infill	12	15
Hickory	7			Low	43	17	Decrease	23	22	Fair	21	21	Migrate	7	13
Maple	7	Abundant	5	FIA	7		New	17	18	Poor	16	17			
Oak	12	Common	37				Unknown	12	11	Very Poor	12	9			
Pine	6	Rare	42							FIA Only	4	4			
Other	49	Absent	21							Unknown	5	4			
	<b>84</b>		<b>105</b>		<b>106</b>	<b>102</b>		<b>106</b>	<b>106</b>		<b>85</b>	<b>84</b>		<b>19</b>	<b>28</b>

#### Potential Changes in Climate Variables

##### Temperature (°F)

	Scenario	2009	2039	2069	2099	
Annual Average	CCSM45	48.9	50.2	51.9	52.0	
	CCSM85	48.9	50.5	52.3	54.4	
	GFDL45	48.9	50.8	52.6	53.2	
	GFDL85	48.9	51.0	53.4	56.1	
	HAD45	48.9	50.5	52.8	53.7	
	HAD85	48.9	50.8	53.9	56.8	
Growing Season (May—Sep)	CCSM45	59.1	60.5	61.9	62.3	
	CCSM85	59.1	60.7	62.6	65.3	
	GFDL45	59.1	61.4	63.6	64.5	
	GFDL85	59.1	61.7	64.7	67.6	
	HAD45	59.1	61.4	63.5	64.6	
	HAD85	59.1	61.5	65.9	68.7	
Coldest Month Average	CCSM45	33.4	35.0	35.7	35.8	
	CCSM85	33.4	35.4	36.0	37.0	
	GFDL45	33.4	35.8	35.8	36.2	
	GFDL85	33.4	34.7	35.5	36.0	
	HAD45	33.4	33.3	34.8	35.1	
	HAD85	33.4	34.2	35.3	36.5	
Warmest Month Average	CCSM45	62.5	64.1	64.9	65.0	
	CCSM85	62.5	64.2	65.4	66.7	
	GFDL45	62.5	65.1	66.2	66.8	
	GFDL85	62.5	65.5	67.3	68.8	
	HAD45	62.5	65.4	67.0	67.5	
	HAD85	62.5	66.1	69.1	70.5	

##### Precipitation (in)

	Scenario	2009	2039	2069	2099	
Annual Total	CCSM45	39.9	41.9	44.8	44.1	
	CCSM85	39.9	43.5	44.7	48.2	
	GFDL45	39.9	44.3	45.4	48.6	
	GFDL85	39.9	43.8	46.7	47.9	
	HAD45	39.9	39.2	42.0	42.8	
	HAD85	39.9	42.0	38.8	41.2	
Growing Season (May—Sep)	CCSM45	16.7	17.7	18.7	18.5	
	CCSM85	16.7	18.2	17.7	19.2	
	GFDL45	16.7	19.3	19.4	20.3	
	GFDL85	16.7	18.5	19.9	20.3	
	HAD45	16.7	16.6	16.4	16.8	
	HAD85	16.7	17.8	14.5	15.7	

**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
yellow-poplar	Liriodendron tulipifera	WDH	High	84.7	1250.1	9.5	Sm. dec.	Lg. dec.	High	Abundant	Good	Good			1	1
red maple	Acer rubrum	WDH	High	84.8	1217.8	8.4	Sm. dec.	Sm. dec.	High	Abundant	Good	Good			1	2
chestnut oak	Quercus prinus	NDH	High	67.1	926.0	7.9	No change	No change	High	Abundant	Very Good	Very Good			1	3
white oak	Quercus alba	WDH	Medium	68.4	687.2	6.1	Sm. inc.	Sm. inc.	High	Abundant	Very Good	Very Good			1	4
Virginia pine	Pinus virginiana	NDH	High	48.3	589.1	8.0	No change	No change	Medium	Abundant	Good	Good			1	5
northern red oak	Quercus rubra	WDH	Medium	64	449.8	4.2	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good			1	6
scarlet oak	Quercus coccinea	WDL	Medium	58.7	435.2	4.5	No change	Sm. dec.	Medium	Common	Fair	Poor			1	7
sourwood	Oxydendrum arboreum	NDL	High	79.2	433.4	3.4	No change	Sm. dec.	High	Common	Good	Fair			1	8
sugar maple	Acer saccharum	WDH	High	51	402.6	3.8	Sm. dec.	Lg. dec.	High	Common	Fair	Fair			1	9
pignut hickory	Carya glabra	WDL	Medium	62.7	350.4	3.4	No change	No change	Medium	Common	Fair	Fair			1	10
eastern redcedar	Juniperus virginiana	WDH	Medium	29.8	349.7	8.9	Sm. inc.	Lg. inc.	Medium	Common	Good	Very Good			1	11
black locust	Robinia pseudoacacia	NDH	Low	53.3	314.1	3.4	No change	No change	Medium	Common	Fair	Fair			1	12
eastern hemlock	Tsuga canadensis	NSH	High	34	290.6	4.4	No change	No change	Low	Common	Poor	Poor			0	13
mockernut hickory	Carya alba	WDL	Medium	53.9	285.4	3.3	Sm. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	14
blackgum	Nyssa sylvatica	WDL	Medium	68.7	280.9	2.5	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good			1	15
black oak	Quercus velutina	WDH	High	55.2	271.0	2.9	Sm. inc.	Lg. inc.	Medium	Common	Good	Very Good			1	16
sweet birch	Betula lenta	NDH	High	41.5	254.5	3.5	Sm. dec.	Sm. dec.	Low	Common	Poor	Poor			0	17
black cherry	Prunus serotina	WDL	Medium	48.6	245.8	3.1	Sm. inc.	Sm. inc.	Low	Common	Fair	Fair			1	18
eastern white pine	Pinus strobus	WDH	High	31.7	243.3	5.8	Sm. inc.	Sm. inc.	Low	Common	Fair	Fair			1	19
American beech	Fagus grandifolia	WDH	High	43.2	219.9	2.9	No change	No change	Medium	Common	Fair	Fair			1	20
sassafras	Sassafras albidum	WSL	Low	45	181.3	2.5	No change	No change	Medium	Common	Fair	Fair			1	21
white ash	Fraxinus americana	WDL	Medium	31	170.0	3.1	Sm. inc.	Sm. inc.	Low	Common	Fair	Fair			1	22
southern red oak	Quercus falcata	WDL	Medium	22.8	164.4	5.7	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	23
shortleaf pine	Pinus echinata	WDH	High	32.6	155.5	3.8	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	24
flowering dogwood	Cornus florida	WDL	Medium	56.2	146.1	1.9	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	25
loblolly pine	Pinus taeda	WDH	High	9.3	139.8	7.5	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good	Infill ++	Infill ++	1	26
shagbark hickory	Carya ovata	WSL	Medium	27.5	111.0	2.4	No change	No change	Medium	Common	Fair	Fair			1	27
yellow birch	Betula alleghaniensis	NDL	High	14.3	98.9	4.0	No change	Sm. dec.	Medium	Common	Fair	Poor	Infill +	Infill +	1	28
American basswood	Tilia americana	WSL	Medium	20.9	96.7	2.0	No change	No change	Medium	Common	Fair	Fair			1	29
sweetgum	Liquidambar styraciflua	WDH	High	16.2	95.6	4.7	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	30
red spruce	Picea rubens	NDH	High	3.2	94.5	14.8	Sm. dec.	Sm. dec.	Low	Rare	Very Poor	Very Poor			2	31
black walnut	Juglans nigra	WDH	Low	22.6	94.1	2.8	No change	Sm. inc.	Medium	Common	Fair	Good			1	32
pitch pine	Pinus rigida	NSH	High	17.4	88.0	3.4	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	33
American elm	Ulmus americana	WDH	Medium	17.2	85.2	3.2	Sm. inc.	Lg. inc.	Medium	Common	Good	Very Good			1	34
chinkapin oak	Quercus muehlenbergii	NSL	Medium	13.7	80.5	4.7	No change	No change	Medium	Common	Fair	Fair			1	35
yellow buckeye	Aesculus flava	NSL	Low	16.9	73.0	2.4	Sm. dec.	Sm. dec.	Low	Common	Poor	Poor			0	36
mountain or Fraser magnolia	Magnolia fraseri	NSL	Low	19.8	72.1	2.3	No change	No change	Low	Common	Poor	Poor			0	37
post oak	Quercus stellata	WDH	High	15	70.0	2.8	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good	Infill ++	Infill ++	1	38
bitternut hickory	Carya cordiformis	WSL	Low	17.5	62.2	2.3	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good			1	39
eastern redbud	Cercis canadensis	NSL	Low	22	61.7	2.1	No change	No change	Medium	Common	Fair	Fair			1	40
cucumbertree	Magnolia acuminata	NSL	Low	20.1	59.3	1.4	Sm. dec.	Sm. dec.	Medium	Common	Poor	Poor			0	41
serviceberry	Amelanchier spp.	NSL	Low	25.2	52.3	1.1	Sm. dec.	No change	Medium	Common	Poor	Fair			1	42
sycamore	Platanus occidentalis	NSL	Low	7.9	50.9	3.7	No change	No change	Medium	Common	Fair	Fair	Infill +	Infill +	1	43
green ash	Fraxinus pennsylvanica	WSH	Low	13.5	49.3	2.3	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			1	44
hackberry	Celtis occidentalis	WDH	Medium	6.9	44.6	4.9	No change	No change	High	Rare	Fair	Fair	Infill +	Infill +	1	45
winged elm	Ulmus alata	WDL	Medium	7	32.8	2.1	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			1	46
Osage-orange	Maclura pomifera	NDH	Medium	1.1	32.2	9.6	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor	Infill +	Infill +	2	47



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boxelder	Acer negundo	WSH	Low	6.1	31.1	2.6	No change	No change	High	Rare	Fair	Fair	Infill +	Infill +	1	48
common persimmon	Diospyros virginiana	NSL	Low	12.8	29.9	2.1	Lg. inc.	Lg. inc.	High	Rare	Good	Good			1	49
red mulberry	Morus rubra	NSL	Low	8	28.0	2.3	No change	No change	Medium	Rare	Poor	Poor			1	50
ailanthus	Ailanthus altissima	NSL	FIA	5.2	27.8	2.7	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	51
silverbell	Halesia spp.	NSL	Low	9.7	26.9	2.1	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	1	52
striped maple	Acer pensylvanicum	NSL	Medium	15.3	26.0	0.9	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	53
American holly	Ilex opaca	NSL	Medium	8.2	24.4	1.9	Sm. dec.	No change	Medium	Rare	Very Poor	Poor		Infill +	1	54
slippery elm	Ulmus rubra	WSL	Low	9.5	22.7	1.3	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	1	55
sugarberry	Celtis laevigata	NDH	Medium	1.3	14.5	10.5	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	56
Table Mountain pine	Pinus pungens	NSL	Low	3.6	14.2	2.9	No change	No change	High	Rare	Fair	Fair	Infill +	Infill +	1	57
American hornbeam; muscle	Carpinus caroliniana	WSL	Low	8	13.9	1.2	No change	Sm. inc.	Medium	Rare	Poor	Fair			1	58
black willow	Salix nigra	NSH	Low	0.7	10.6	8.3	No change	Sm. inc.	Low	Rare	Very Poor	Poor		Infill +	2	59
pin cherry	Prunus pensylvanica	NSL	Low	2.5	10.1	1.1	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	1	60
eastern hophornbeam; ironw	Ostrya virginiana	WSL	Low	6.8	9.5	0.7	Lg. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	Infill ++	1	61
paulownia	Paulownia tomentosa	NSL	FIA	3.3	8.8	1.4	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	62
American chestnut	Castanea dentata	NSLX	FIA	6.7	7.1	0.7	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	63
sand hickory	Carya pallida	NSL	FIA	1.9	4.3	0.9	Unknown	Unknown	NA	Rare	FIA Only	FIA Only			0	64
bigleaf magnolia	Magnolia macrophylla	NSL	Low	2.5	4.1	0.8	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	65
black maple	Acer nigrum	NSH	Low	0.6	3.7	1.2	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor			0	66
white mulberry	Morus alba	NSL	FIA	2.6	3.6	1.3	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	67
blue ash	Fraxinus quadrangulata	NSL	Low	1.2	2.8	2.0	Sm. dec.	Sm. dec.	Low	Rare	Very Poor	Very Poor			0	68
pawpaw	Asimina triloba	NSL	Low	1	2.2	1.0	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	69
silver maple	Acer saccharinum	NSH	Low	0.9	2.0	2.2	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor			0	70
Shumard oak	Quercus shumardii	NSL	Low	1	2.0	0.9	Sm. dec.	Lg. inc.	High	Rare	Poor	Good			2	71
blackjack oak	Quercus marilandica	NSL	Medium	1.7	1.8	0.6	Lg. inc.	Lg. inc.	High	Rare	Good	Good			2	72
shingle oak	Quercus imbricaria	NDH	Medium	0.5	1.4	3.0	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	73
eastern cottonwood	Populus deltoides	NSH	Low	0.5	1.4	3.0	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	74
honeylocust	Gleditsia triacanthos	NSH	Low	0.6	1.2	0.7	Lg. inc.	Lg. inc.	High	Rare	Good	Good			2	75
mountain maple	Acer spicatum	NSL	Low	0.6	0.7	0.7	No change	No change	High	Rare	Fair	Fair			0	76
wild plum	Prunus americana	NSLX	FIA	0.5	0.7	1.6	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	77
river birch	Betula nigra	NSL	Low	0.3	0.6	0.8	Sm. dec.	Lg. inc.	Medium	Rare	Very Poor	Good			2	78
pecan	Carya illinoensis	NSH	Low	0.4	0.4	0.7	Lg. inc.	Lg. inc.	Low	Rare	Fair	Fair		Infill +	2	79
swamp white oak	Quercus bicolor	NSL	Low	0.4	0.3	0.7	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	80
American mountain-ash	Sorbus americana	NSL	Low	0.8	0.3	0.3	Lg. dec.	Lg. dec.	Low	Rare	Very Poor	Very Poor			0	81
northern white-cedar	Thuja occidentalis	WSH	High	0.1	0.3	0.2	No change	No change	Medium	Rare	Poor	Poor			0	82
shellbark hickory	Carya laciniosa	NSL	Low	0.4	0.3	0.6	Very Lg. dec.	Very Lg. dec.	Medium	Rare	Lost	Lost			0	83
butternut	Juglans cinerea	NSLX	FIA	0.5	0.2	0.5	Unknown	Unknown	Low	Rare	FIA Only	FIA Only			0	84
ashe juniper	Juniperus ashei	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			0	85
slash pine	Pinus elliottii	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate ++	3	86
longleaf pine	Pinus palustris	NSH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	87
pond cypress	Taxodium ascendens	NSH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate ++		3	88
florida maple	Acer barbatum	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	89
Ohio buckeye	Aesculus glabra	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	90
gray birch	Betula populifolia	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	91
cittamwood/gum bumelia	Sideroxylon lanuginosum ssp.	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			3	92
black hickory	Carya texana	NDL	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate ++	3	93
black ash	Fraxinus nigra	WSH	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat			3	94



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southern magnolia	Magnolia grandiflora	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +	3	95
swamp tupelo	Nyssa biflora	NDH	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat		Migrate +	3	96
bigtooth aspen	Populus grandidentata	NSL	Medium	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown				0 97
cherrybark oak; swamp red o.	Quercus pagoda	NSL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	98
laurel oak	Quercus laurifolia	NDH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +	3	99
overcup oak	Quercus lyrata	NSL	Medium	0	0	0	Unknown	New Habitat	Low	Absent	Unknown	New Habitat		Migrate +	3	100
swamp chestnut oak	Quercus michauxii	NSL	Low	0	0	0	Unknown	Unknown	Medium	Modeled	Unknown	Unknown				0 101
water oak	Quercus nigra	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate ++	Migrate ++	3	102
willow oak	Quercus phellos	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	103
live oak	Quercus virginiana	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate ++	3	104
bluejack oak	Quercus incana	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +	3	105
cedar elm	Ulmus crassifolia	NDH	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat				0 106