

# HUC 110100 Upper White

## 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	57,879	22,347	1,769

### 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	25	Increase	RCP45	RCP85	Very Good	15	17	Likely	1	1	
Ash	4			Medium	35	58	No Change	20	20	Good	15	17	Infill	24	25
Hickory	8			Low	38	13	Decrease	23	18	Fair	13	13	Migrate	0	8
Maple	5	Abundant	6	FIA	8		New	12	13	Poor	17	15			
Oak	19	Common	25				Unknown	13	12	Very Poor	15	13			
Pine	3	Rare	52							FIA Only	5	5			
Other	44	Absent	17							Unknown	5	4			
	<b>83</b>		<b>100</b>		<b>100</b>	<b>96</b>		<b>100</b>	<b>100</b>		<b>85</b>	<b>84</b>		<b>25</b>	<b>34</b>

### Potential Changes in Climate Variables

#### Temperature (°F)

	Scenario	2009	2039	2069	2099	
Annual Average	CCSM45	54.4	56.1	57.8	58.1	
	CCSM85	54.4	56.4	58.6	61.2	
	GFDL45	54.4	57.0	58.9	59.8	
	GFDL85	54.4	57.0	59.6	62.9	
	HAD45	54.4	56.7	59.3	60.6	
	HAD85	54.4	57.0	61.1	64.3	
Growing Season (May—Sep)	CCSM45	68.2	69.9	71.3	71.9	
	CCSM85	68.2	70.4	72.5	75.9	
	GFDL45	68.2	71.2	73.5	75.0	
	GFDL85	68.2	71.5	74.5	78.6	
	HAD45	68.2	70.9	73.3	74.7	
	HAD85	68.2	71.2	76.5	79.5	
Coldest Month Average	CCSM45	33.1	35.1	36.2	36.5	
	CCSM85	33.1	35.6	36.5	38.0	
	GFDL45	33.1	36.8	37.0	37.2	
	GFDL85	33.1	34.7	35.9	36.5	
	HAD45	33.1	34.0	36.0	36.2	
	HAD85	33.1	35.3	37.1	38.7	
Warmest Month Average	CCSM45	73.5	75.4	76.2	76.5	
	CCSM85	73.5	75.9	76.9	78.5	
	GFDL45	73.5	77.5	78.6	79.6	
	GFDL85	73.5	77.4	78.8	81.7	
	HAD45	73.5	76.7	78.3	78.9	
	HAD85	73.5	77.8	80.9	82.1	

#### Precipitation (in)

	Scenario	2009	2039	2069	2099	
Annual Total	CCSM45	41.4	40.5	44.6	42.8	
	CCSM85	41.4	42.5	44.0	44.6	
	GFDL45	41.4	45.6	48.1	46.9	
	GFDL85	41.4	45.7	51.1	51.2	
	HAD45	41.4	40.4	44.2	44.6	
	HAD85	41.4	44.3	40.0	42.7	
Growing Season (May—Sep)	CCSM45	17.1	16.0	17.1	16.4	
	CCSM85	17.1	16.9	15.8	16.2	
	GFDL45	17.1	18.9	18.6	19.1	
	GFDL85	17.1	19.0	20.7	20.3	
	HAD45	17.1	16.2	16.4	16.0	
	HAD85	17.1	17.2	13.5	13.6	

**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
white oak	Quercus alba	WDH	Medium	78	1434.1	15.9	Sm. dec.	Sm. dec.	High	Abundant	Good	Good			1	1
black oak	Quercus velutina	WDH	High	78.9	1122.2	12.8	Sm. dec.	Sm. dec.	Medium	Abundant	Fair	Fair			0	2
post oak	Quercus stellata	WDH	High	79.2	987.0	11.5	Sm. inc.	Sm. inc.	High	Abundant	Very Good	Very Good			1	3
eastern redcedar	Juniperus virginiana	WDH	Medium	62	716.1	10.9	Sm. inc.	Sm. inc.	Medium	Abundant	Very Good	Very Good			1	4
shortleaf pine	Pinus echinata	WDH	High	39.7	611.2	13.4	Sm. inc.	Lg. inc.	Medium	Abundant	Very Good	Very Good			1	5
black hickory	Carya texana	NDL	High	75	536.8	6.4	Sm. inc.	Sm. inc.	Medium	Abundant	Very Good	Very Good			1	6
northern red oak	Quercus rubra	WDH	Medium	50.5	404.6	7.0	No change	No change	High	Common	Good	Good			1	7
mockernut hickory	Carya alba	WDL	Medium	66.1	356.4	4.7	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good			1	8
southern red oak	Quercus falcata	WDL	Medium	32.4	233.5	6.9	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	9
scarlet oak	Quercus coccinea	WDL	Medium	18.9	229.7	10.7	Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor	Infill +	Infill +	0	10
blackgum	Nyssa sylvatica	WDL	Medium	52.3	227.7	3.5	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good			1	11
blackjack oak	Quercus marilandica	NSL	Medium	33.3	214.6	5.7	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	12
winged elm	Ulmus alata	WDL	Medium	56.2	167.3	2.7	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	13
black walnut	Juglans nigra	WDH	Low	33	139.6	4.1	No change	Sm. inc.	Medium	Common	Fair	Good			1	14
sweetgum	Liquidambar styraciflua	WDH	High	17.9	138.1	6.4	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good	Infill ++	Infill ++	1	15
flowering dogwood	Cornus florida	WDL	Medium	57.3	127.4	1.9	No change	No change	Medium	Common	Fair	Fair			1	16
white ash	Fraxinus americana	WDL	Medium	42.3	124.2	2.5	Sm. inc.	Sm. inc.	Low	Common	Fair	Fair			1	17
American elm	Ulmus americana	WDH	Medium	35.5	123.6	3.0	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	18
chinkapin oak	Quercus muehlenbergii	NSL	Medium	31.3	121.2	3.5	No change	No change	Medium	Common	Fair	Fair			1	19
red maple	Acer rubrum	WDH	High	32.7	116.5	2.8	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	20
sassafras	Sassafras albidum	WSL	Low	40.4	104.8	2.1	No change	No change	Medium	Common	Fair	Fair			1	21
bitternut hickory	Carya cordiformis	WDL	Low	24.3	101.6	3.4	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good			1	22
black cherry	Prunus serotina	WDL	Medium	40.3	99.6	2.2	Lg. inc.	Lg. inc.	Low	Common	Good	Good			1	23
sycamore	Platanus occidentalis	NSL	Low	17.7	93.2	4.8	Sm. inc.	Lg. inc.	Medium	Common	Good	Very Good			1	24
pignut hickory	Carya glabra	WDL	Medium	16.5	88.5	4.0	Sm. dec.	No change	Medium	Common	Poor	Fair	Infill +	Infill +	1	25
slippery elm	Ulmus rubra	WSL	Low	30.1	81.4	2.3	Sm. inc.	Lg. inc.	Medium	Common	Good	Very Good			1	26
common persimmon	Diospyros virginiana	NSL	Low	27.7	79.7	2.4	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	27
loblolly pine	Pinus taeda	WDH	High	4	66.3	21.6	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	2	28
sugar maple	Acer saccharum	WDH	High	15	59.2	3.3	Sm. dec.	No change	High	Common	Fair	Good	Infill +	Infill ++	1	29
shagbark hickory	Carya ovata	WSL	Medium	17.2	57.4	3.0	Sm. dec.	No change	Medium	Common	Poor	Fair			1	30
hackberry	Celtis occidentalis	WDH	Medium	20.3	55.7	2.6	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	31
florida maple	Acer barbatum	NSL	Low	11.2	55.5	4.3	Sm. dec.	Sm. dec.	High	Common	Fair	Fair	Infill +	Infill +	1	32
green ash	Fraxinus pennsylvanica	WSH	Low	16.6	47.1	2.5	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			1	33
honeylocust	Gleditsia triacanthos	NSH	Low	11.8	43.3	3.6	Lg. inc.	Lg. inc.	High	Rare	Good	Good			1	34
black locust	Robinia pseudoacacia	NDH	Low	8.1	41.5	4.2	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	1	35
water oak	Quercus nigra	WDH	High	3.2	38.0	10.6	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	36
eastern redbud	Cercis canadensis	NSL	Low	24.5	36.3	1.3	Sm. inc.	Lg. inc.	Medium	Rare	Fair	Good			1	37
sugarberry	Celtis laevigata	NDH	Medium	7.8	35.9	4.4	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	2	38
Shumard oak	Quercus shumardii	NSL	Low	9.8	31.7	2.9	No change	No change	High	Rare	Fair	Fair	Infill +	Infill +	1	39
red mulberry	Morus rubra	NSL	Low	18.3	30.3	1.5	No change	Sm. inc.	Medium	Rare	Poor	Fair			1	40
boxelder	Acer negundo	WSH	Low	5.5	25.0	3.9	No change	Sm. inc.	High	Rare	Fair	Good	Infill +	Infill ++	1	41
Nuttall oak	Quercus texana	NSH	Medium	3.3	23.1	13.1	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor			0	42
eastern hophornbeam; ironw	Ostrya virginiana	WSL	Low	16.6	21.0	1.1	Lg. inc.	Lg. inc.	High	Rare	Good	Good			1	43
ashe juniper	Juniperus ashei	NDH	High	1.6	20.3	13.0	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			0	44
cherrybark oak; swamp red o.	Quercus pagoda	NSL	Medium	3.8	19.0	4.9	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	45
willow oak	Quercus phellos	NSL	Low	2.8	18.8	4.1	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	46
silver maple	Acer saccharinum	NSH	Low	2.1	16.9	9.0	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor	Infill +	Infill +	2	47



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overcup oak	Quercus lyrata	NSL	Medium	1.8	15.6	5.8	No change	No change	Low	Rare	Very Poor	Very Poor			2	48
serviceberry	Amelanchier spp.	NSL	Low	12.2	12.8	0.9	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	49
river birch	Betula nigra	NSL	Low	3.1	11.7	5.3	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	50
American hornbeam; muscle	Carpinus caroliniana	WSL	Low	6.7	11.3	1.3	No change	Sm. inc.	Medium	Rare	Poor	Fair	Infill +	Infill +	1	51
pecan	Carya illinoensis	NSH	Low	1.7	10.8	8.9	Lg. inc.	Lg. inc.	Low	Rare	Fair	Fair	Infill +	Infill +	2	52
black willow	Salix nigra	NSH	Low	0.9	10.7	10.1	No change	Sm. inc.	Low	Rare	Very Poor	Poor		Infill +	2	53
wild plum	Prunus americana	NSLX	FIA	4.7	10.6	2.2	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	54
American beech	Fagus grandifolia	WDH	High	0.9	10.3	3.5	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	55
blue ash	Fraxinus quadrangulata	NSL	Low	3.2	9.0	3.1	Lg. dec.	Lg. dec.	Low	Rare	Very Poor	Very Poor			0	56
bald cypress	Taxodium distichum	NSH	Medium	0.7	8.5	8.1	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	57
water tupelo	Nyssa aquatica	NSH	Medium	1	8.4	8.1	Sm. dec.	Sm. dec.	Low	Rare	Very Poor	Very Poor			2	58
pawpaw	Asimina triloba	NSL	Low	4	7.9	1.5	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	59
eastern cottonwood	Populus deltoides	NSH	Low	0.9	7.5	11.0	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			2	60
American basswood	Tilia americana	WSL	Medium	4.5	7.0	1.4	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			2	61
cittamwood/gum bumelia	Sideroxylon lanuginosum ssp.	NSL	Low	5.3	5.9	1.1	Lg. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	Infill ++	1	62
water elm	Planera aquatica	NSL	Low	0.5	5.3	4.8	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	63
swamp chestnut oak	Quercus michauxii	NSL	Low	2.1	4.7	2.7	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	64
Osage-orange	Maclura pomifera	NDH	Medium	2.2	4.6	2.2	Sm. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	Infill ++	2	65
pin oak	Quercus palustris	NSH	Low	0.9	4.3	9.2	Sm. dec.	No change	Low	Rare	Very Poor	Very Poor			2	66
Ohio buckeye	Aesculus glabra	NSL	Low	1.6	3.7	2.4	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	67
shingle oak	Quercus imbricaria	NDH	Medium	1.6	3.6	2.0	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	68
water hickory	Carya aquatica	NSL	Medium	1.2	3.6	3.0	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	69
laurel oak	Quercus laurifolia	NDH	Medium	0.3	3.5	10.1	Sm. dec.	No change	Medium	Rare	Very Poor	Poor			0	70
cedar elm	Ulmus crassifolia	NDH	Medium	0.5	3.0	3.3	Lg. inc.	Lg. inc.	Low	Rare	Fair	Fair	Infill +	Infill +	2	71
eastern white pine	Pinus strobus	WDH	High	0.2	2.7	14.5	Lg. dec.	Lg. dec.	Low	Rare	Very Poor	Very Poor			0	72
paulownia	Paulownia tomentosa	NSL	FIA	0.6	2.2	2.6	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	73
ailanthus	Ailanthus altissima	NSL	FIA	1	2.0	1.8	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	74
butternut	Juglans cinerea	NSLX	FIA	1.2	2.0	1.7	Unknown	Unknown	Low	Rare	FIA Only	FIA Only			0	75
waterlocust	Gleditsia aquatica	NSLX	FIA	1.2	1.9	1.8	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	76
northern catalpa	Catalpa speciosa	NSHX	FIA	0.3	1.3	3.5	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	77
bur oak	Quercus macrocarpa	NDH	Medium	0.4	1.1	0.5	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor			0	78
cucumbertree	Magnolia acuminata	NSL	Low	0.6	0.9	1.2	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			2	79
shellbark hickory	Carya laciniosa	NSL	Low	1.3	0.8	1.2	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	80
white mulberry	Morus alba	NSL	FIA	0.2	0.4	2.2	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	81
American holly	Ilex opaca	NSL	Medium	0.3	0.3	0.8	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	82
Carolina ash	Fraxinus caroliniana	NSL	FIA	0.4	0.1	1.3	Unknown	Unknown	NA	Rare	FIA Only	FIA Only			0	83
slash pine	Pinus elliottii	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate ++	3	84
longleaf pine	Pinus palustris	NSH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +	3	85
Virginia pine	Pinus virginiana	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +	3	86
striped maple	Acer pensylvanicum	NSL	Medium	0	0	0	Unknown	New Habitat	Medium	Absent	Unknown	New Habitat			3	87
yellow birch	Betula alleghaniensis	NDL	High	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	88
black ash	Fraxinus nigra	WSH	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat			3	89
silverbell	Halesia spp.	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	90
yellow-poplar	Liriodendron tulipifera	WDH	High	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Likely +	Likely +	3	91
southern magnolia	Magnolia grandiflora	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +	3	92
sweetbay	Magnolia virginiana	NSL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +	3	93
bigleaf magnolia	Magnolia macrophylla	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	94



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mountain or Fraser magnolia	Magnolia fraseri	NSL	Low	0	0	0	Unknown	Unknown	Low	Absent	Unknown	Unknown			0	95
sourwood	Oxydendrum arboreum	NDL	High	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +		3	96
pin cherry	Prunus pensylvanica	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	97
chestnut oak	Quercus prinus	NDH	High	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +		3	98
live oak	Quercus virginiana	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	99
bluejack oak	Quercus incana	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +		3	100