

HUC 030101 Roanoke

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 25,297 9,767.2 797

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			SHIFT		
		Abundance		Reliability			RCP45			RCP85			RCP45		
Ash	4			High	22	26	Increase	28	37	Very Good	11	15	Likely	1	1
Hickory	6			Medium	37	58	No Change	24	21	Good	15	15	Infill	21	28
Maple	5	Abundant	6	Low	41	19	Decrease	34	28	Fair	14	20	igrate	2	4
Oak	19	Common	27	FIA	7		New	7	9	Poor	18	14		24	33
Pine	7	Rare	60				Unknown	14	12	Very Poor	26	20			
Other	52	Absent	13					107	107	FIA Only	4	4			
	93		106		107	103				Unknown	7	5			
												95	93		
Potential Changes in Climate Variables															

Potential Changes in Climate Variables

Temperature (°F)

	Scenario	2009	2039	2069	2099	
Annual Average	CCSM45	51.8	53.2	54.9	55.0	
	CCSM85	51.8	53.5	55.4	57.8	
	GFDL45	51.8	53.9	55.9	56.6	
	GFDL85	51.8	54.2	56.8	59.7	
	HAD45	51.8	53.6	56.0	57.0	
	HAD85	51.8	53.8	56.9	60.2	
Growing Season May—Sep	CCSM45	63.2	64.7	66.2	66.6	
	CCSM85	63.2	64.9	66.9	69.9	
	GFDL45	63.2	65.6	67.9	68.9	
	GFDL85	63.2	66.1	69.0	72.3	
	HAD45	63.2	65.5	67.8	69.0	
	HAD85	63.2	65.5	69.4	73.0	
Coldest Month Average	CCSM45	34.9	36.5	37.3	37.5	
	CCSM85	34.9	36.8	37.6	38.5	
	GFDL45	34.9	37.5	37.8	38.4	
	GFDL85	34.9	36.6	37.4	38.3	
	HAD45	34.9	35.6	37.0	37.2	
	HAD85	34.9	35.8	36.9	38.1	
Warmest Month Average	CCSM45	67.6	69.2	70.0	70.1	
	CCSM85	67.6	69.3	70.7	72.0	
	GFDL45	67.6	70.0	71.0	71.8	
	GFDL85	67.6	70.7	72.3	74.2	
	HAD45	67.6	70.0	71.6	72.2	
	HAD85	67.6	70.6	73.0	75.3	

Precipitation (in)

	Scenario	2009	2039	2069	2099	
Annual Total	CCSM45	35.4	38.8	41.0	41.3	
	CCSM85	35.4	39.8	41.3	45.8	
	GFDL45	35.4	39.4	42.0	43.8	
	GFDL85	35.4	38.0	42.4	43.3	
	HAD45	35.4	38.4	39.0	38.3	
	HAD85	35.4	40.1	37.7	39.0	
Growing Season May—Sep	CCSM45	16.3	19.4	20.6	21.0	
	CCSM85	16.3	19.2	19.7	22.1	
	GFDL45	16.3	18.4	19.9	20.9	
	GFDL85	16.3	17.4	20.3	20.7	
	HAD45	16.3	18.1	17.5	17.2	
	HAD85	16.3	19.1	17.7	17.6	

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
loblolly pine	Pinus taeda	WDH	High	56.7	2049.1	23.3	Sm. inc.	Sm. inc.	Medium	Abundant	Very Good	Very Good			1	1
yellow-poplar	Liriodendron tulipifera	WDH	High	85.3	1403.0	11.5	Lg. dec.	Lg. dec.	High	Abundant	Good	Good			1	2
red maple	Acer rubrum	WDH	High	96.2	1078.8	7.7	Sm. dec.	Sm. dec.	High	Abundant	Good	Good			1	3
Virginia pine	Pinus virginiana	NDH	High	70.4	1023.2	12.2	Lg. dec.	Lg. dec.	Medium	Abundant	Fair	Fair			0	4
sweetgum	Liquidambar styraciflua	WDH	High	58.5	824.6	8.7	Sm. inc.	Sm. inc.	Medium	Abundant	Very Good	Very Good			1	5
white oak	Quercus alba	WDH	Medium	78.3	601.6	5.4	No change	No change	High	Abundant	Very Good	Very Good			1	6
chestnut oak	Quercus prinus	NDH	High	33.5	487.5	10.5	Sm. dec.	Sm. dec.	High	Common	Fair	Fair			1	7
sourwood	Oxydendrum arboreum	NDL	High	68	326.6	3.5	Lg. dec.	Lg. dec.	High	Common	Fair	Fair			1	8
shortleaf pine	Pinus echinata	WDH	High	39.3	257.9	5.1	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	9
mockernut hickory	Carya alba	WDL	Medium	57.9	216.6	2.8	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good			1	10
black cherry	Prunus serotina	WDL	Medium	64.3	215.5	2.5	Sm. inc.	Sm. inc.	Low	Common	Fair	Fair			1	11
blackgum	Nyssa sylvatica	WDL	Medium	71.5	208.7	2.2	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good			1	12
northern red oak	Quercus rubra	WDH	Medium	54.4	207.8	2.6	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good			1	13
eastern redcedar	Juniperus virginiana	WDH	Medium	48	175.8	2.7	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	14
American beech	Fagus grandifolia	WDH	High	40.9	167.1	3.0	No change	No change	Medium	Common	Fair	Fair			1	15
scarlet oak	Quercus coccinea	WDL	Medium	41.8	155.8	2.6	Sm. dec.	Sm. dec.	Medium	Common	Poor	Poor			0	16
southern red oak	Quercus falcata	WDL	Medium	44.1	146.2	2.4	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	17
American hornbeam; muscley	Carpinus caroliniana	WSL	Low	48.5	136.2	2.1	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	18
pignut hickory	Carya glabra	WDL	Medium	49.9	128.1	1.9	Sm. inc.	No change	Medium	Common	Good	Fair			1	19
black oak	Quercus velutina	WDH	High	45.6	124.2	2.1	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	20
eastern white pine	Pinus strobus	WDH	High	15.8	116.0	4.4	Sm. dec.	Sm. dec.	Low	Common	Poor	Poor	Infill +	Infill +	0	21
green ash	Fraxinus pennsylvanica	WSH	Low	35.3	114.6	2.3	Sm. inc.	Lg. inc.	Medium	Common	Good	Very Good			1	22
black locust	Robinia pseudoacacia	NDH	Low	28.4	113.6	3.0	Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor			0	23
white ash	Fraxinus americana	WDL	Medium	29.9	90.6	1.7	Sm. inc.	Sm. inc.	Low	Common	Fair	Fair			1	24
ailanthus	Ailanthus altissima	NSL	FIA	17.7	90.0	3.7	Unknown	Unknown	NA	Common	NNIS	NNIS			0	25
sycamore	Platanus occidentalis	NSL	Low	25.2	89.9	2.9	Sm. inc.	Lg. inc.	Medium	Common	Good	Very Good			1	26
flowering dogwood	Cornus florida	WDL	Medium	55.1	87.8	1.2	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	27
swamp tupelo	Nyssa biflora	NDH	Medium	8	79.2	4.9	No change	No change	Low	Common	Poor	Poor	Infill +	Infill +	2	28
willow oak	Quercus phellos	NSL	Low	21.5	74.7	2.2	Sm. inc.	Lg. inc.	Medium	Common	Good	Very Good			1	29
American elm	Ulmus americana	WDH	Medium	30.5	74.6	1.6	Sm. inc.	Lg. inc.	Medium	Common	Good	Very Good			1	30
water tupelo	Nyssa aquatica	NSH	Medium	4.7	70.4	12.0	No change	No change	Low	Rare	Very Poor	Very Poor			2	31
river birch	Betula nigra	NSL	Low	9.5	66.3	4.0	No change	No change	Medium	Common	Fair	Fair			1	32
black walnut	Juglans nigra	WDH	Low	13.7	66.1	3.0	Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor			0	33
post oak	Quercus stellata	WDH	High	24.7	55.0	1.3	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good	Infill ++	Infill ++	1	34
winged elm	Ulmus alata	WDL	Medium	22.6	46.7	1.8	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			1	35
eastern redbud	Cercis canadensis	NSL	Low	24	45.9	1.5	Lg. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	36
boxelder	Acer negundo	WSH	Low	7.1	38.3	4.7	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor		Infill +	1	37
water oak	Quercus nigra	WDH	High	8	37.9	1.5	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	2	38
pitch pine	Pinus rigida	NSH	High	9.2	34.7	1.6	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	39
American holly	Ilex opaca	NSL	Medium	14.4	34.2	1.0	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	1	40
sassafras	Sassafras albidum	WSL	Low	14.4	32.9	1.6	Lg. dec.	No change	Medium	Rare	Very Poor	Poor			1	41
bald cypress	Taxodium distichum	NSH	Medium	6	30.7	3.7	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	42
common persimmon	Diospyros virginiana	NSL	Low	16.7	29.2	1.2	Lg. dec.	Sm. inc.	High	Rare	Poor	Good			1	43
sweet birch	Betula lenta	NDH	High	8.6	28.1	2.5	No change	No change	Low	Rare	Very Poor	Very Poor			2	44
cucumbertree	Magnolia acuminata	NSL	Low	9.4	24.4	1.6	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	45
slippery elm	Ulmus rubra	WSL	Low	14.7	22.4	1.4	Lg. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	46
shagbark hickory	Carya ovata	WSL	Medium	9.2	21.3	1.0	No change	Sm. dec.	Medium	Rare	Poor	Very Poor	Infill +		1	47

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hackberry	Celtis occidentalis	WDH	Medium	6.2	19.7	2.3	Sm. dec.	No change	High	Rare	Poor	Fair	Infill +	Infill +	1	48
sugar maple	Acer saccharum	WDH	High	5.6	19.0	1.6	No change	No change	High	Rare	Fair	Fair	Infill +	Infill +	2	49
sweetbay	Magnolia virginiana	NSL	Medium	5.2	18.3	0.8	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	50
cherrybark oak; swamp red o.	Quercus pagoda	NSL	Medium	3.4	17.1	3.4	No change	Sm. inc.	Medium	Rare	Poor	Fair	Infill +	Infill +	2	51
laurel oak	Quercus laurifolia	NDH	Medium	4.8	15.7	2.2	Sm. inc.	Lg. inc.	Medium	Rare	Fair	Good	Infill +	Infill ++	2	52
black willow	Salix nigra	NSH	Low	4.2	11.8	1.2	No change	Lg. inc.	Low	Rare	Very Poor	Fair		Infill +	2	53
pond pine	Pinus serotina	NSH	Medium	0.9	11.7	3.1	No change	No change	Low	Rare	Very Poor	Very Poor			2	54
sugarberry	Celtis laevigata	NDH	Medium	1.9	11.4	5.7	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	55
eastern hophornbeam; ironw	Ostrya virginiana	WSL	Low	6.4	11.1	1.6	Sm. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	Infill ++	1	56
eastern hemlock	Tsuga canadensis	NSH	High	4.3	11.0	1.5	No change	No change	Low	Rare	Very Poor	Very Poor			2	57
bitternut hickory	Carya cordiformis	WSL	Low	6.2	10.9	1.7	No change	No change	High	Rare	Fair	Fair	Infill +	Infill +	1	58
mountain or Fraser magnolia	Magnolia fraseri	NSL	Low	2	10.1	3.9	Sm. dec.	Sm. dec.	Low	Rare	Very Poor	Very Poor			0	59
American basswood	Tilia americana	WSL	Medium	3.4	8.5	3.0	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	60
loblolly-bay	Gordonia lasianthus	NSH	Medium	0.3	8.5	5.5	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	61
florida maple	Acer barbatum	NSL	Low	5.2	8.1	1.1	No change	Sm. inc.	High	Rare	Fair	Good	Infill +	Infill ++	2	62
swamp chestnut oak	Quercus michauxii	NSL	Low	3.3	7.6	1.0	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	63
eastern cottonwood	Populus deltoides	NSH	Low	2	7.4	1.7	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	64
paulownia	Paulownia tomentosa	NSL	FIA	1.5	5.6	3.4	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	65
redbay	Persea borbonia	NSL	Low	1.3	5.2	0.7	No change	No change	High	Rare	Fair	Fair	Infill +	Infill +	2	66
Table Mountain pine	Pinus pungens	NSL	Low	3.1	5.0	1.8	No change	No change	High	Rare	Fair	Fair		Infill +	2	67
red mulberry	Morus rubra	NSL	Low	3.3	5.0	0.9	Sm. dec.	No change	Medium	Rare	Very Poor	Poor		Infill +	2	68
serviceberry	Amelanchier spp.	NSL	Low	5.9	4.0	0.5	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	69
overcup oak	Quercus lyrata	NSL	Medium	2.3	3.5	1.5	Sm. inc.	Lg. inc.	Low	Rare	Poor	Fair	Infill +	Infill +	2	70
honeylocust	Gleditsia triacanthos	NSH	Low	2.8	3.3	1.2	Lg. dec.	Sm. inc.	High	Rare	Poor	Good		Infill ++	2	71
pawpaw	Asimina triloba	NSL	Low	4.7	3.1	0.7	Lg. dec.	Very Lg. dec.	Medium	Rare	Very Poor	Lost			0	72
pecan	Carya illinoensis	NSH	Low	1.1	2.9	2.4	No change	Lg. inc.	Low	Rare	Very Poor	Fair		Infill +	2	73
shingle oak	Quercus imbricaria	NDH	Medium	1.8	2.7	1.2	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	74
pin cherry	Prunus pensylvanica	NSL	Low	1.5	2.5	1.5	Sm. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	75
striped maple	Acer pensylvanicum	NSL	Medium	2.5	2.4	1.1	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	76
southern magnolia	Magnolia grandiflora	NSL	Low	1.8	1.8	0.6	No change	Sm. inc.	Medium	Rare	Poor	Fair		Infill +	2	77
yellow birch	Betula alleghaniensis	NDL	High	0.8	1.6	0.9	Sm. dec.	No change	Medium	Rare	Very Poor	Poor		Infill +	2	78
bear oak; scrub oak	Quercus ilicifolia	NSLX	FIA	0.4	1.6	0.3	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	79
chinkapin oak	Quercus muehlenbergii	NSL	Medium	0.4	1.2	1.4	Sm. inc.	Sm. inc.	Medium	Rare	Fair	Fair	Infill +	Infill +	2	80
blackjack oak	Quercus marilandica	NSL	Medium	0.7	1.2	0.4	Lg. inc.	Lg. inc.	High	Rare	Good	Good			2	81
water hickory	Carya aquatica	NSL	Medium	1.2	1.1	0.9	No change	Sm. inc.	Medium	Rare	Poor	Fair	Infill +	Infill +	2	82
bigleaf magnolia	Magnolia macrophylla	NSL	Low	1.2	0.9	0.8	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	83
yellow buckeye	Aesculus flava	NSL	Low	0.2	0.7	1.0	Sm. dec.	Lg. dec.	Low	Rare	Very Poor	Very Poor			2	84
white mulberry	Morus alba	NSL	FIA	0.4	0.6	1.5	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	85
Carolina ash	Fraxinus caroliniana	NSL	FIA	0.5	0.6	0.6	Unknown	Unknown	NA	Rare	FIA Only	FIA Only			0	86
Shumard oak	Quercus shumardii	NSL	Low	0.8	0.4	0.5	Very Lg. dec.	Sm. inc.	High	Rare	Lost	Good			2	87
bigtooth aspen	Populus grandidentata	NSL	Medium	0.4	0.3	0.7	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	88
pin oak	Quercus palustris	NSH	Low	0.4	0.2	0.6	Very Lg. dec.	Very Lg. dec.	Low	Rare	Lost	Lost			0	89
butternut	Juglans cinerea	NSLX	FIA	0.4	0.2	0.5	Unknown	Unknown	Low	Rare	FIA Only	FIA Only			0	90
rock elm	Ulmus thomasi	NSLX	FIA	0.2	0.2	0.2	Unknown	Unknown	Low	Rare	FIA Only	FIA Only			0	91
black ash	Fraxinus nigra	WSH	Medium	0.1	0.1	0.1	No change	Sm. inc.	Low	Rare	Very Poor	Poor			0	92
Atlantic white-cedar	Chamaecyparis thyoides	NSH	Low	0	0.0	0.0	Lg. dec.	Lg. dec.	Low	Rare	Very Poor	Very Poor			0	93
slash pine	Pinus elliotii	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate ++	Migrate ++	3	94

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Common Name	Scientific Name	Range	MR	%Cell	FIAsum	FIAiv	ChngCI45	ChngCI85	Adap	Abund	Capabil45	Capabil85	SHIFT45	SHIFT85	SSO	N
longleaf pine	<i>Pinus palustris</i>	NSH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Likely +	Likely +	3	95
northern white-cedar	<i>Thuja occidentalis</i>	WSH	High	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	96
black maple	<i>Acer nigrum</i>	NSH	Low	0	0	0	Unknown	Unknown	High	Absent	Unknown	Unknown			0	97
mountain maple	<i>Acer spicatum</i>	NSL	Low	0	0	0	Unknown	Unknown	High	Absent	Unknown	Unknown			0	98
Ohio buckeye	<i>Aesculus glabra</i>	NSL	Low	0	0	0	Unknown	Unknown	Medium	Modeled	Unknown	Unknown			0	99
cittamwood/gum bumelia	<i>Sideroxylon lanuginosum</i> ssp.	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			0	100
shellbark hickory	<i>Carya laciniosa</i>	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	101
black hickory	<i>Carya texana</i>	NDL	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			0	102
silverbell	<i>Halesia</i> spp.	NSL	Low	0	0	0	Unknown	New Habitat	Medium	Absent	Unknown	New Habitat			3	103
Osage-orange	<i>Maclura pomifera</i>	NDH	Medium	0	0	0	Unknown	New Habitat	High	Absent	Unknown	New Habitat		Migrate +	3	104
live oak	<i>Quercus virginiana</i>	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate ++	3	105
bluejack oak	<i>Quercus incana</i>	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +	3	106
cedar elm	<i>Ulmus crassifolia</i>	NDH	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat			0	107