

HUC 020501 Upper Susquehanna

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	29,284	11,307	755

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			
		Model	Reliability	Adaptability	Scenario	Scenario	Scenario	Scenario	RCP45	RCP85	SHIFT	SHIFT	
		High	24	24	Increase	20	23	Very Good	6	8	Likely	2	2
Ash	3	Medium	29	50	No Change	12	9	Good	15	16	Infill	12	14
Hickory	5	Low	32	15	Decrease	29	29	Fair	10	7	Migrate	2	11
Maple	7	FIA	8		New	16	19	Poor	11	11		16	27
Oak	8				Unknown	16	13	Very Poor	17	13			
Pine	7					93	93	FIA Only	4	4			
Other	39							Unknown	8	5			
	69								71	64			

Potential Changes in Climate Variables

Temperature (°F)

Scenario	2009	2039	2069	2099	
Annual	CCSM45	43.1	44.7	46.6	46.7
Average	CCSM85	43.1	45.0	47.1	49.6
	GFDL45	43.1	45.4	48.0	49.0
	GFDL85	43.1	45.9	49.0	52.6
	HAD45	43.1	45.6	48.2	49.6
	HAD85	43.1	45.6	49.0	53.2
Growing Season	CCSM45	56.3	58.0	59.5	59.9
	CCSM85	56.3	58.1	60.1	63.3
May—Sep	GFDL45	56.3	58.8	62.0	63.2
	GFDL85	56.3	59.7	63.2	67.1
	HAD45	56.3	58.9	61.2	63.1
	HAD85	56.3	58.6	62.5	67.2
Coldest Month	CCSM45	22.8	24.4	26.0	26.1
Average	CCSM85	22.8	25.0	26.0	27.6
	GFDL45	22.8	25.3	26.5	27.0
	GFDL85	22.8	25.6	26.9	28.6
	HAD45	22.8	24.2	26.6	26.7
	HAD85	22.8	25.2	27.1	29.5
Warmest Month	CCSM45	60.9	62.8	63.7	63.9
Average	CCSM85	60.9	63.1	64.4	66.2
	GFDL45	60.9	63.3	65.1	66.1
	GFDL85	60.9	64.4	66.4	68.8
	HAD45	60.9	63.9	65.2	66.5
	HAD85	60.9	63.9	66.3	69.7

Precipitation (in)

Scenario	2009	2039	2069	2099	
Annual	CCSM45	32.3	32.6	32.3	35.0
Total	CCSM85	32.3	33.2	34.2	35.3
	GFDL45	32.3	35.6	37.0	36.4
	GFDL85	32.3	33.7	36.4	38.0
	HAD45	32.3	33.5	34.4	33.6
	HAD85	32.3	34.5	33.4	36.1
Growing Season	CCSM45	15.5	15.9	15.5	16.6
May—Sep	CCSM85	15.5	15.7	16.2	15.7
	GFDL45	15.5	16.1	15.8	16.0
	GFDL85	15.5	15.3	15.6	15.5
	HAD45	15.5	16.0	14.7	15.0
	HAD85	15.5	15.6	14.5	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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Current and Potential Future Habitat, Capability, and Migration

Common Name	Scientific Name	Range	MR	%Cell	FIAsum	FIAiv	ChngCl45	ChngCl85	Adap	Abund	Capabil45	Capabil85	SHIFT45	SHIFT85	SSO	N
red maple	Acer rubrum	WDH	High	84.3	1996.2	16.4	Sm. dec.	Sm. dec.	High	Abundant	Good	Good			1	1
sugar maple	Acer saccharum	WDH	High	71.9	1489.0	14.4	Sm. dec.	Sm. dec.	High	Abundant	Good	Good			1	2
white ash	Fraxinus americana	WDL	Medium	75.3	1143.7	10.8	No change	No change	Low	Abundant	Fair	Fair			0	3
eastern hemlock	Tsuga canadensis	NSH	High	55.2	795.8	11.1	Sm. dec.	Lg. dec.	Low	Abundant	Fair	Poor			0	4
eastern white pine	Pinus strobus	WDH	High	46.5	577.9	9.7	No change	Sm. dec.	Low	Abundant	Fair	Fair			0	5
black cherry	Prunus serotina	WDL	Medium	60.6	562.4	6.4	Sm. inc.	Sm. inc.	Low	Abundant	Good	Good			1	6
American beech	Fagus grandifolia	WDH	High	52.5	544.5	6.3	Sm. dec.	Sm. dec.	Medium	Abundant	Fair	Fair			0	7
northern red oak	Quercus rubra	WDH	Medium	51.6	507.3	7.1	Sm. inc.	Sm. inc.	High	Abundant	Very Good	Very Good			1	8
quaking aspen	Populus tremuloides	WDH	High	31.5	317.7	7.1	Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor			0	9
sweet birch	Betula lenta	NDH	High	44.9	292.3	4.9	No change	No change	Low	Common	Poor	Poor			0	10
chestnut oak	Quercus prinus	NDH	High	18.4	245.9	9.7	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	11
eastern hophornbeam; ironw	Ostrya virginiana	WSL	Low	45.6	181.0	2.8	No change	No change	High	Common	Good	Good			1	12
white oak	Quercus alba	WDH	Medium	20.6	171.0	5.9	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	13
red pine	Pinus resinosa	NSH	Medium	9.6	160.5	10.0	Lg. dec.	Very Lg. dec.	Low	Common	Very Poor	Lost			0	14
yellow birch	Betula alleghaniensis	NDL	High	23.9	134.5	3.5	Sm. dec.	Sm. dec.	Medium	Common	Poor	Poor			0	15
Norway spruce	Picea abies	NSH	FIA	9.3	134.2	10.5	Unknown	Unknown	NA	Common	NNIS	NNIS			0	16
American basswood	Tilia americana	WSL	Medium	24.3	127.7	3.6	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	17
American elm	Ulmus americana	WDH	Medium	22.2	122.8	4.3	Sm. inc.	Lg. inc.	Medium	Common	Good	Very Good			1	18
bigtooth aspen	Populus grandidentata	NSL	Medium	22.7	122.0	4.3	No change	Lg. dec.	Medium	Common	Fair	Poor			1	19
Scots pine	Pinus sylvestris	NSH	FIA	7.7	88.0	8.0	Unknown	Unknown	NA	Common	NNIS	NNIS			0	20
black locust	Robinia pseudoacacia	NDH	Low	7.8	84.0	8.1	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	21
shagbark hickory	Carya ovata	WDL	Medium	15.3	71.8	3.2	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	22
black oak	Quercus velutina	WDL	High	16.9	66.8	3.5	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	23
bitternut hickory	Carya cordiformis	WSL	Low	12.1	65.9	3.4	No change	Lg. inc.	High	Common	Good	Very Good			1	24
white spruce	Picea glauca	NSL	Medium	3.4	65.3	16.9	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	25
eastern cottonwood	Populus deltoides	NSH	Low	2.6	62.9	10.5	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	26
serviceberry	Amelanchier spp.	NSL	Low	26.7	57.6	1.5	No change	Sm. dec.	Medium	Common	Fair	Poor			1	27
scarlet oak	Quercus coccinea	WDL	Medium	8.7	50.7	4.3	Sm. inc.	Sm. inc.	Medium	Common	Good	Good	Infill ++	Infill ++	1	28
green ash	Fraxinus pennsylvanica	WSH	Low	2.4	48.8	5.1	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	1	29
American hornbeam; musclev	Carpinus caroliniana	WSL	Low	20.9	48.4	1.8	No change	Sm. inc.	Medium	Rare	Poor	Fair			1	30
paper birch	Betula papyrifera	WDH	High	11.1	47.1	3.4	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	31
blackgum	Nyssa sylvatica	WDL	Medium	7.1	41.8	3.3	Sm. inc.	Sm. inc.	High	Rare	Good	Good	Infill ++	Infill ++	1	32
pignut hickory	Carya glabra	WDL	Medium	12.4	40.1	2.5	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			1	33
sassafras	Sassafras albidum	WSL	Low	6.1	35.7	2.4	Sm. inc.	Sm. inc.	Medium	Rare	Fair	Fair	Infill +	Infill +	1	34
silver maple	Acer saccharinum	NSH	Low	1.4	34.7	25.3	Sm. dec.	No change	High	Rare	Poor	Fair		Infill +	2	35
striped maple	Acer pensylvanicum	NSL	Medium	13	26.7	1.3	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	36
Virginia pine	Pinus virginiana	NDH	High	3.1	24.2	7.7	No change	Lg. inc.	Medium	Rare	Poor	Good	Infill +	Infill ++	2	37
bear oak; scrub oak	Quercus ilicifolia	NSLX	FIA	1.4	22.8	5.8	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	38
black willow	Salix nigra	NSH	Low	1.6	21.1	6.9	Sm. dec.	Sm. dec.	Low	Rare	Very Poor	Very Poor			2	39
red spruce	Picea rubens	NDH	High	2.6	21.1	5.5	Lg. dec.	Lg. dec.	Low	Rare	Very Poor	Very Poor			0	40
pin cherry	Prunus pensylvanica	NSL	Low	6.6	21.0	2.4	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	41
pitch pine	Pinus rigida	NSH	High	2.7	19.0	4.3	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	42
gray birch	Betula populifolia	NSL	Low	5.6	18.9	2.5	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	43
northern white-cedar	Thuja occidentalis	WSH	High	1	16.5	9.0	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	44
black walnut	Juglans nigra	WDH	Low	3.3	15.8	2.3	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	1	45
sycamore	Platanus occidentalis	NSL	Low	2	15.3	7.3	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	2	46
boxelder	Acer negundo	WSH	Low	1.4	13.3	9.8	No change	No change	High	Rare	Fair	Fair	Infill +	Infill +	1	47

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yellow-poplar	<i>Liriodendron tulipifera</i>	WDH	High	3.1	12.8	2.4	Lg. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	Infill ++	2	48
black ash	<i>Fraxinus nigra</i>	WSH	Medium	0.5	11.6	16.8	Very Lg. dec.	Very Lg. dec.	Low	Rare	Lost	Lost			0	49
ailanthus	<i>Ailanthus altissima</i>	NSL	FIA	1	11.5	11.3	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	50
balsam fir	<i>Abies balsamea</i>	NDH	High	1.1	8.3	1.9	Lg. dec.	Very Lg. dec.	Low	Rare	Very Poor	Lost			0	51
chokecherry	<i>Prunus virginiana</i>	NSLX	FIA	1.8	8.1	2.6	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	52
mockernut hickory	<i>Carya alba</i>	WDL	Medium	3.6	7.4	1.9	Lg. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	Infill ++	2	53
butternut	<i>Juglans cinerea</i>	NSLX	FIA	2	6.5	3.1	Unknown	Unknown	Low	Rare	FIA Only	FIA Only			0	54
eastern redcedar	<i>Juniperus virginiana</i>	WDH	Medium	1.4	5.4	4.0	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	55
slippery elm	<i>Ulmus rubra</i>	WSL	Low	1	4.1	1.1	Sm. inc.	Lg. inc.	Medium	Rare	Fair	Good	Infill +		2	56
bur oak	<i>Quercus macrocarpa</i>	NDH	Medium	0.1	3.9	4.5	Lg. dec.	Lg. dec.	High	Rare	Poor	Poor			0	57
jack pine	<i>Pinus banksiana</i>	NSH	Medium	0	3.0	0.7	Very Lg. dec.	Very Lg. dec.	High	Rare	Lost	Lost			0	58
tamarack (native)	<i>Larix laricina</i>	NSH	High	0.7	2.4	3.4	Lg. dec.	Very Lg. dec.	Low	Rare	Very Poor	Lost			0	59
cucumbertree	<i>Magnolia acuminata</i>	NSL	Low	0.9	1.7	1.5	Sm. dec.	No change	Medium	Rare	Very Poor	Poor		Infill +	2	60
flowering dogwood	<i>Cornus florida</i>	WDL	Medium	1	1.3	0.4	Sm. inc.	Lg. inc.	Medium	Rare	Fair	Good		Infill ++	2	61
shellbark hickory	<i>Carya laciniosa</i>	NSL	Low	0.1	1.2	1.4	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	62
river birch	<i>Betula nigra</i>	NSL	Low	0.3	1.1	3.1	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			2	63
mountain maple	<i>Acer spicatum</i>	NSL	Low	0.3	0.5	1.5	Lg. dec.	Sm. dec.	High	Rare	Poor	Poor			0	64
American chestnut	<i>Castanea dentata</i>	NSLX	FIA	0.3	0.5	0.4	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	65
balsam poplar	<i>Populus balsamifera</i>	NSH	Medium	0.3	0.4	1.1	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	66
Table Mountain pine	<i>Pinus pungens</i>	NSL	Low	0	0.4	0.1	Lg. dec.	Very Lg. dec.	High	Rare	Poor	Lost			0	67
Norway maple	<i>Acer platanooides</i>	NSL	FIA	0.1	0.1	0.1	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	68
pin oak	<i>Quercus palustris</i>	NSH	Low	0.3	0.1	0.2	Lg. dec.	No change	Low	Rare	Very Poor	Very Poor			0	69
shortleaf pine	<i>Pinus echinata</i>	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate ++	3	70
loblolly pine	<i>Pinus taeda</i>	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate ++	3	71
florida maple	<i>Acer barbatum</i>	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			3	72
cittamwood/gum bumelia	<i>Sideroxylon lanuginosum ssp.</i>	NSL	Low	0	0	0	Unknown	New Habitat	High	Absent	Unknown	New Habitat			0	73
black hickory	<i>Carya texana</i>	NDL	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			0	74
sugarberry	<i>Celtis laevigata</i>	NDH	Medium	0	0	0	Unknown	New Habitat	Medium	Absent	Unknown	New Habitat			3	75
hackberry	<i>Celtis occidentalis</i>	WDH	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Likely +	Likely +	3	76
eastern redbud	<i>Cercis canadensis</i>	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	77
common persimmon	<i>Diospyros virginiana</i>	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat		Migrate +	3	78
silverbell	<i>Halesia spp.</i>	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	79
American holly	<i>Ilex opaca</i>	NSL	Medium	0	0	0	Unknown	Unknown	Medium	Modeled	Unknown	Unknown			0	80
sweetgum	<i>Liquidambar styraciflua</i>	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate ++	3	81
bigleaf magnolia	<i>Magnolia macrophylla</i>	NSL	Low	0	0	0	New Habitat	Unknown	Medium	Absent	New Habitat	Unknown			3	82
mountain or Fraser magnolia	<i>Magnolia fraseri</i>	NSL	Low	0	0	0	Unknown	New Habitat	Low	Absent	Unknown	New Habitat			0	83
sourwood	<i>Oxydendrum arboreum</i>	NDL	High	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	84
swamp white oak	<i>Quercus bicolor</i>	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Likely +	Likely +	3	85
southern red oak	<i>Quercus falcata</i>	WDL	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat		Migrate +	3	86
cherrybark oak; swamp red o.	<i>Quercus pagoda</i>	NSL	Medium	0	0	0	Unknown	New Habitat	Medium	Absent	Unknown	New Habitat			3	87
blackjack oak	<i>Quercus marilandica</i>	NSL	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat		Migrate ++	3	88
swamp chestnut oak	<i>Quercus michauxii</i>	NSL	Low	0	0	0	Unknown	Unknown	Medium	Modeled	Unknown	Unknown			0	89
chinkapin oak	<i>Quercus muehlenbergii</i>	NSL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +	3	90
post oak	<i>Quercus stellata</i>	WDH	High	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat		Migrate ++	3	91
American mountain-ash	<i>Sorbus americana</i>	NSL	Low	0	0	0	Unknown	Unknown	Low	Absent	Unknown	Unknown			0	92
winged elm	<i>Ulmus alata</i>	WDL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +	3	93

