

sq. km sq. mi FIA Plots
Area of Region 17,817 6,879.3 477

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	14	13	Likely	2	2
Ash	3			Medium	37	No Change	14	10	Good	9	13	Infill	14	13
Hickory	4			Low	34	Decrease	26	25	Fair	8	9	Migrate	13	18
Maple	7	Abundant	5	FIA	8	New	28	30	Poor	18	15			
Oak	10	Common	21			Unknown	12	10	Very Poor	14	13			
Pine	7	Rare	46						FIA Only	4	4			
Other	41	Absent	31						Unknown	4	2			
	72		103		104		104	104		71	69			

Potential Changes in Climate Variables

Temperature (°F)

	Scenario	2009	2039	2069	2099	
Annual Average	CCSM45	43.1	44.5	46.2	46.4	
	CCSM85	43.1	44.8	46.7	49.1	
	GFDL45	43.1	45.2	47.5	48.4	
	GFDL85	43.1	45.6	48.4	51.6	
	HAD45	43.1	45.2	47.7	48.9	
HAD85	43.1	45.3	48.4	52.2		
Growing Season (May—Sep)	CCSM45	55.4	56.9	58.3	58.7	
	CCSM85	55.4	57.1	59.0	61.9	
	GFDL45	55.4	57.7	60.5	61.5	
	GFDL85	55.4	58.4	61.6	65.0	
	HAD45	55.4	57.8	59.9	61.6	
HAD85	55.4	57.4	61.0	65.2		
Coldest Month (Average)	CCSM45	24.2	25.6	26.9	27.2	
	CCSM85	24.2	26.1	27.0	28.5	
	GFDL45	24.2	26.6	27.6	28.2	
	GFDL85	24.2	26.7	27.8	29.4	
	HAD45	24.2	25.6	27.6	27.8	
HAD85	24.2	26.4	28.0	30.2		
Warmest Month (Average)	CCSM45	59.7	61.6	62.4	62.5	
	CCSM85	59.7	61.8	63.0	64.6	
	GFDL45	59.7	61.9	63.5	64.4	
	GFDL85	59.7	62.9	64.8	66.9	
	HAD45	59.7	62.4	63.6	64.6	
HAD85	59.7	62.2	64.3	67.3		

Precipitation (in)

	Scenario	2009	2039	2069	2099	
Annual Total	CCSM45	35.8	36.9	36.9	40.2	
	CCSM85	35.8	37.1	39.2	41.1	
	GFDL45	35.8	39.7	41.9	41.2	
	GFDL85	35.8	37.8	41.1	43.3	
	HAD45	35.8	37.5	38.3	37.9	
HAD85	35.8	38.8	37.9	40.1		
Growing Season (May—Sep)	CCSM45	16.6	18.3	18.0	19.4	
	CCSM85	16.6	17.5	18.9	18.6	
	GFDL45	16.6	17.3	17.4	18.1	
	GFDL85	16.6	16.6	17.4	17.9	
	HAD45	16.6	17.6	16.2	16.3	
HAD85	16.6	17.0	16.1	16.7		

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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HUC 020401 Upper Delaware

HUC 6 Watershed Climate Change Atlas Tree Species

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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	93.4	2265.8	18.1	Sm. dec.	Sm. dec.	High	Abundant	Good	Good			1	1
sugar maple	Acer saccharum	WDH	High	57.6	908.0	12.0	No change	Sm. dec.	High	Abundant	Very Good	Good			1	2
American beech	Fagus grandifolia	WDH	High	55.1	655.1	9.1	Sm. dec.	Sm. dec.	Medium	Abundant	Fair	Fair			0	3
chestnut oak	Quercus prinus	NDH	High	44	648.7	12.6	Sm. inc.	Sm. inc.	High	Abundant	Very Good	Very Good			1	4
white ash	Fraxinus americana	WDL	Medium	70.2	638.6	7.7	No change	No change	Low	Abundant	Fair	Fair			0	5
white oak	Quercus alba	WDH	Medium	40.4	496.8	10.0	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good			1	6
sweet birch	Betula lenta	NDH	High	64.2	496.3	6.2	No change	Sm. dec.	Low	Common	Poor	Poor			0	7
eastern hemlock	Tsuga canadensis	NSH	High	46.4	492.3	9.0	Sm. dec.	Sm. dec.	Low	Common	Poor	Poor			0	8
black cherry	Prunus serotina	WDL	Medium	61.3	466.2	6.1	Sm. inc.	Sm. inc.	Low	Common	Fair	Fair			1	9
northern red oak	Quercus rubra	WDH	Medium	58.1	452.4	5.6	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good			1	10
eastern white pine	Pinus strobus	WDH	High	31.2	356.9	9.2	No change	No change	Low	Common	Poor	Poor			0	11
yellow birch	Betula alleghaniensis	NDL	High	46.2	263.3	4.5	Sm. dec.	Sm. dec.	Medium	Common	Poor	Poor			0	12
scarlet oak	Quercus coccinea	WDL	Medium	25.1	186.4	6.8	Lg. inc.	Sm. inc.	Medium	Common	Very Good	Good			1	13
yellow-poplar	Liriodendron tulipifera	WDH	High	20.7	164.2	7.9	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	14
sassafras	Sassafras albidum	WSL	Low	35.1	126.2	3.8	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	15
black oak	Quercus velutina	WDH	High	29.4	121.6	3.7	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	16
blackgum	Nyssa sylvatica	WDL	Medium	24.1	104.1	3.2	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	17
eastern redcedar	Juniperus virginiana	WDH	Medium	14.3	101.9	7.6	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good	Infill ++	Infill ++	1	18
pignut hickory	Carya glabra	WDL	Medium	23.6	97.4	3.3	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	19
serviceberry	Amelanchier spp.	NSL	Low	32.9	83.0	1.9	Sm. dec.	Sm. dec.	Medium	Common	Poor	Poor			0	20
quaking aspen	Populus tremuloides	WDH	High	9.1	82.7	3.1	Sm. dec.	Sm. dec.	Medium	Common	Poor	Poor			0	21
eastern hophornbeam; ironw	Ostrya virginiana	WSL	Low	29.2	70.7	1.9	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good			1	22
sweetgum	Liquidambar styraciflua	WDH	High	1.4	66.1	2.8	No change	Sm. inc.	Medium	Rare	Poor	Fair	Infill +	Infill +	2	23
American basswood	Tilia americana	WSL	Medium	18	63.3	2.3	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	24
black walnut	Juglans nigra	WDH	Low	13.3	53.3	8.0	Sm. inc.	Lg. inc.	Medium	Common	Good	Very Good	Infill ++	Infill ++	1	25
pitch pine	Pinus rigida	NSH	High	13.7	51.9	2.5	Sm. dec.	Sm. dec.	Medium	Common	Poor	Poor			0	26
shagbark hickory	Carya ovata	WSL	Medium	18.3	50.8	2.9	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	27
bigtooth aspen	Populus grandidentata	NSL	Medium	14.5	47.6	2.2	Lg. inc.	Sm. inc.	Medium	Rare	Good	Fair			1	28
red pine	Pinus resinosa	NSH	Medium	3.8	45.8	10.1	Very Lg. dec.	Very Lg. dec.	Low	Rare	Lost	Lost			0	29
striped maple	Acer pensylvanicum	NSL	Medium	16.1	44.5	2.1	Sm. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	30
American elm	Ulmus americana	WDH	Medium	15.1	43.1	2.5	Sm. inc.	Lg. inc.	Medium	Rare	Fair	Good			1	31
black locust	Robinia pseudoacacia	NDH	Low	4.1	40.6	6.2	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	1	32
bear oak; scrub oak	Quercus ilicifolia	NSLX	FIA	2.1	38.8	4.6	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	33
red spruce	Picea rubens	NDH	High	7.3	38.5	4.0	Sm. dec.	Lg. dec.	Low	Rare	Very Poor	Very Poor			0	34
mockernut hickory	Carya alba	WDL	Medium	9.8	32.7	3.1	Sm. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	Infill ++	1	35
Scots pine	Pinus sylvestris	NSH	FIA	2.3	29.7	4.8	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	36
gray birch	Betula populifolia	NSL	Low	9.6	27.7	2.1	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	37
American hornbeam; musclev	Carpinus caroliniana	WSL	Low	14.3	27.7	1.1	No change	Lg. inc.	Medium	Rare	Poor	Good			1	38
swamp white oak	Quercus bicolor	NSL	Low	2.2	26.2	11.5	Sm. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			2	39
hackberry	Celtis occidentalis	WDH	Medium	1.1	25.8	23.0	Sm. dec.	No change	High	Rare	Poor	Fair	Infill +	Infill +	2	40
white spruce	Picea glauca	NSL	Medium	2	23.5	10.3	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	41
Norway spruce	Picea abies	NSH	FIA	5.2	20.3	4.5	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	42
black spruce	Picea mariana	NSH	High	0.1	18.1	3.9	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	43
flowering dogwood	Cornus florida	WDL	Medium	10.9	17.9	1.4	No change	Sm. inc.	Medium	Rare	Poor	Fair	Infill +	Infill +	1	44
ailanthus	Ailanthus altissima	NSL	FIA	3.3	17.0	6.0	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	45
pin oak	Quercus palustris	NSH	Low	3.9	15.7	4.5	No change	No change	Low	Rare	Very Poor	Very Poor			0	46
eastern cottonwood	Populus deltoides	NSH	Low	0.1	14.7	0.7	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			2	47



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pin cherry	Prunus pensylvanica	NSL	Low	2.8	13.7	3.6	Sm. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	48
green ash	Fraxinus pennsylvanica	WSH	Low	5.4	12.2	2.7	No change	Sm. inc.	Medium	Rare	Poor	Fair	Infill +	Infill +	1	49
chokecherry	Prunus virginiana	NSLX	FIA	1.3	11.6	0.8	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	50
bitternut hickory	Carya cordiformis	WSL	Low	7.3	11.5	2.4	No change	Lg. inc.	High	Rare	Fair	Good	Infill +	Infill ++	2	51
boxelder	Acer negundo	WSH	Low	6.8	9.5	5.0	No change	No change	High	Rare	Fair	Fair	Infill +	Infill +	2	52
balsam fir	Abies balsamea	NDH	High	0.6	9.4	2.1	Lg. dec.	Lg. dec.	Low	Rare	Very Poor	Very Poor			0	53
Norway maple	Acer platanoides	NSL	FIA	4.4	8.7	3.4	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	54
black willow	Salix nigra	NSH	Low	0.8	8.4	3.5	Sm. dec.	No change	Low	Rare	Very Poor	Very Poor			2	55
tamarack (native)	Larix laricina	NSH	High	2.7	7.1	7.3	Lg. dec.	Lg. dec.	Low	Rare	Very Poor	Very Poor			0	56
shortleaf pine	Pinus echinata	WDH	High	0	4.6	0.6	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	57
slippery elm	Ulmus rubra	WSL	Low	2.5	4.1	0.7	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	58
silver maple	Acer saccharinum	NSH	Low	2	3.9	3.8	No change	Sm. inc.	High	Rare	Fair	Good	Infill +		2	59
sycamore	Platanus occidentalis	NSL	Low	4.1	3.2	1.0	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	60
northern pin oak	Quercus ellipsoidalis	NSH	Medium	0.1	3.1	1.0	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor			0	61
river birch	Betula nigra	NSL	Low	1.2	2.9	1.1	Sm. dec.	No change	Medium	Rare	Very Poor	Poor		Infill +	2	62
butternut	Juglans cinerea	NSLX	FIA	2.5	2.9	1.9	Unknown	Unknown	Low	Rare	FIA Only	FIA Only			0	63
Osage-orange	Maclura pomifera	NDH	Medium	1.5	2.6	12.3	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor			0	64
American chestnut	Castanea dentata	NSLX	FIA	3.3	2.2	0.5	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	65
black ash	Fraxinus nigra	WSH	Medium	0.9	2.1	1.6	Lg. dec.	Lg. dec.	Low	Rare	Very Poor	Very Poor			0	66
paper birch	Betula papyrifera	WDH	High	0.8	1.7	0.5	Sm. inc.	No change	Medium	Rare	Fair	Poor	Infill +		2	67
Virginia pine	Pinus virginiana	NDH	High	1.1	1.6	1.4	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	68
jack pine	Pinus banksiana	NSH	Medium	0.6	1.2	2.1	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor			0	69
red mulberry	Morus rubra	NSL	Low	2.2	0.5	3.5	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	70
mountain maple	Acer spicatum	NSL	Low	0.6	0.4	0.7	Lg. dec.	Lg. dec.	High	Rare	Poor	Poor			0	71
chinkapin oak	Quercus muehlenbergii	NSL	Medium	0.3	0.3	0.3	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	72
longleaf pine	Pinus palustris	NSH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			0	73
loblolly pine	Pinus taeda	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate ++	Migrate ++	3	74
bald cypress	Taxodium distichum	NSH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +	3	75
florida maple	Acer barbatum	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			3	76
yellow buckeye	Aesculus flava	NSL	Low	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat		Migrate +	3	77
cittamwood/gum bumelia	Sideroxylon lanuginosum ssp.	NSL	Low	0	0	0	Unknown	New Habitat	High	Absent	Unknown	New Habitat			0	78
pecan	Carya illinoensis	NSH	Low	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat			3	79
black hickory	Carya texana	NDL	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			0	80
sugarberry	Celtis laevigata	NDH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	81
eastern redbud	Cercis canadensis	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	82
common persimmon	Diospyros virginiana	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	83
American holly	Ilex opaca	NSL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Likely +	Likely +	3	84
cucumbertree	Magnolia acuminata	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	85
sweetbay	Magnolia virginiana	NSL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Likely +	Likely +	3	86
mountain or Fraser magnolia	Magnolia fraseri	NSL	Low	0	0	0	Unknown	New Habitat	Low	Absent	Unknown	New Habitat			0	87
water tupelo	Nyssa aquatica	NSH	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat			3	88
swamp tupelo	Nyssa biflora	NDH	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat	Migrate +	Migrate ++	3	89
sourwood	Oxydendrum arboreum	NDL	High	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	90
redbay	Persea borbonia	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	91
southern red oak	Quercus falcata	WDL	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +	Migrate ++	3	92
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	93
shingle oak	Quercus imbricaria	NDH	Medium	0	0	0	Unknown	Unknown	Medium	Modeled	Unknown	Unknown			0	94



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laurel oak	Quercus laurifolia	NDH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +	3	95
overcup oak	Quercus lyrata	NSL	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat			3	96
blackjack oak	Quercus marilandica	NSL	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat		Migrate ++	3	97
swamp chestnut oak	Quercus michauxii	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	98
water oak	Quercus nigra	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate ++	3	99
willow oak	Quercus phellos	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	100
post oak	Quercus stellata	WDH	High	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate ++	Migrate ++	3	101
bluejack oak	Quercus incana	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	102
American mountain-ash	Sorbus americana	NSL	Low	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat			0	103
winged elm	Ulmus alata	WDL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate ++	3	104