

Current and Potential Future Habitat, Capability, and Migration

	sq. km	sq. mi	FIA Plots
Area of Region	16,891	6,521.5	365

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 RCP45	Scenario RCP85	Scenario RCP45	Scenario RCP85	SHIFT RCP45	SHIFT RCP85				
Ash	3			High	17	28	Increase	28	35	Very Good	12	17	Likely	1	1
Hickory	8			Medium	32	50	No Change	17	11	Good	19	14	Infill	17	19
Maple	5	Abundant	2	Low	38	12	Decrease	25	24	Fair	10	14	Migrate	1	5
Oak	18	Common	36	FIA	8		New	11	11	Poor	18	15		19	25
Pine	5	Rare	40				Unknown	14	14	Very Poor	10	9			
Other	39	Absent	16							FIA Only	4	4			
	78		94		95	90		95	95	Unknown	6	6			
											79	79			

Potential Changes in Climate Variables

Temperature (°F)

	Scenario	2009	2039	2069	2099	
Annual Average	CCSM45	49.0	50.2	51.7	51.9	
	CCSM85	49.0	50.5	52.4	54.4	
	GFDL45	49.0	51.2	52.5	53.1	
	GFDL85	49.0	51.0	53.2	55.7	
	HAD45	49.0	50.9	53.1	54.1	
HAD85	49.0	51.2	54.3	57.1		
Growing Season (May—Sep)	CCSM45	60.0	61.3	62.4	62.9	
	CCSM85	60.0	61.5	63.5	66.1	
	GFDL45	60.0	62.5	64.1	65.0	
	GFDL85	60.0	62.3	65.0	68.1	
	HAD45	60.0	62.3	64.5	65.7	
HAD85	60.0	62.6	67.0	69.6		
Coldest Month (Average)	CCSM45	31.8	32.8	33.9	34.2	
	CCSM85	31.8	33.8	34.5	35.6	
	GFDL45	31.8	34.7	34.8	35.1	
	GFDL85	31.8	33.3	34.1	34.4	
	HAD45	31.8	32.7	34.3	34.4	
HAD85	31.8	33.4	34.9	36.1		
Warmest Month (Average)	CCSM45	63.8	65.0	65.7	66.1	
	CCSM85	63.8	65.5	66.7	67.9	
	GFDL45	63.8	66.1	67.0	67.6	
	GFDL85	63.8	66.3	67.8	69.6	
	HAD45	63.8	66.6	68.3	68.9	
HAD85	63.8	67.9	70.8	72.1		

Precipitation (in)

	Scenario	2009	2039	2069	2099	
Annual Total	CCSM45	32.5	32.0	35.8	34.8	
	CCSM85	32.5	34.8	35.2	37.2	
	GFDL45	32.5	37.5	39.6	40.9	
	GFDL85	32.5	37.0	40.5	42.7	
	HAD45	32.5	32.4	34.7	34.6	
HAD85	32.5	33.2	31.6	35.0		
Growing Season (May—Sep)	CCSM45	13.4	12.4	13.5	13.0	
	CCSM85	13.4	13.6	12.5	13.2	
	GFDL45	13.4	15.5	15.6	16.0	
	GFDL85	13.4	15.3	15.7	16.4	
	HAD45	13.4	12.5	11.9	11.7	
HAD85	13.4	12.6	10.1	10.4		

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
sugar maple	Acer saccharum	WDH	High	56.4	609.7	9.2	Sm. dec.	Sm. dec.	High	Abundant	Good	Good			1	1
white oak	Quercus alba	WDH	Medium	60.1	590.5	9.0	Sm. dec.	Sm. dec.	High	Abundant	Good	Good			1	2
sweetgum	Liquidambar styraciflua	WDH	High	55.6	452.8	8.3	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	3
pignut hickory	Carya glabra	WDL	Medium	60.3	416.9	6.3	Sm. dec.	Lg. dec.	Medium	Common	Poor	Poor			0	4
yellow-poplar	Liriodendron tulipifera	WDH	High	41.6	390.1	6.9	Lg. dec.	Lg. dec.	High	Common	Fair	Fair			1	5
black oak	Quercus velutina	WDH	High	49.9	308.8	5.3	No change	No change	Medium	Common	Fair	Fair			1	6
silver maple	Acer saccharinum	NSH	Low	23.1	302.4	13.9	Sm. dec.	Sm. dec.	High	Common	Fair	Fair			1	7
white ash	Fraxinus americana	WDL	Medium	59.4	300.5	4.5	No change	No change	Low	Common	Poor	Poor			0	8
sassafras	Sassafras albidum	WSL	Low	64.4	258.6	4.0	Sm. dec.	Sm. dec.	Medium	Common	Poor	Poor			0	9
green ash	Fraxinus pennsylvanica	WSH	Low	54.6	254.6	4.8	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	10
red maple	Acer rubrum	WDH	High	41.4	235.8	5.3	No change	Sm. inc.	High	Common	Good	Very Good			1	11
winged elm	Ulmus alata	WDL	Medium	56.2	216.5	3.9	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	12
post oak	Quercus stellata	WDH	High	46.2	203.5	5.0	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	13
shagbark hickory	Carya ovata	WSL	Medium	56.7	192.8	3.4	Sm. dec.	Sm. dec.	Medium	Common	Poor	Poor			0	14
black cherry	Prunus serotina	WDL	Medium	51.5	181.1	3.1	No change	No change	Low	Common	Poor	Poor			0	15
blackgum	Nyssa sylvatica	WDL	Medium	47.6	178.9	3.5	No change	Sm. inc.	High	Common	Good	Very Good			1	16
American elm	Ulmus americana	WDH	Medium	63.7	169.1	3.0	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	17
eastern redcedar	Juniperus virginiana	WDH	Medium	33.6	162.4	3.4	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	18
shortleaf pine	Pinus echinata	WDH	High	11.1	141.0	14.1	Sm. inc.	Lg. inc.	Medium	Common	Good	Very Good	Infill ++	Infill ++	1	19
hackberry	Celtis occidentalis	WDH	Medium	40	136.1	3.8	No change	Sm. inc.	High	Common	Good	Very Good			1	20
sycamore	Platanus occidentalis	NSL	Low	29.6	130.1	3.7	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	21
black locust	Robinia pseudoacacia	NDH	Low	18.2	124.3	7.8	No change	No change	Medium	Common	Fair	Fair			1	22
northern red oak	Quercus rubra	WDH	Medium	36.9	119.0	3.1	No change	No change	High	Common	Good	Good			1	23
Virginia pine	Pinus virginiana	NDH	High	9.4	107.6	9.0	Sm. dec.	Sm. dec.	Medium	Common	Poor	Poor	Infill +	Infill +	0	24
boxelder	Acer negundo	WSH	Low	28.2	100.0	4.3	Sm. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	25
flowering dogwood	Cornus florida	WDL	Medium	50.3	99.6	1.8	Sm. dec.	Sm. dec.	Medium	Common	Poor	Poor			0	26
mockernut hickory	Carya alba	WDL	Medium	22.2	93.1	3.8	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	27
shingle oak	Quercus imbricaria	NDH	Medium	20.1	90.6	3.8	No change	No change	Medium	Common	Fair	Fair	Infill +	Infill +	1	28
slippery elm	Ulmus rubra	WSL	Low	35.8	86.0	2.2	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	29
common persimmon	Diospyros virginiana	NSL	Low	39.4	84.3	2.8	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	30
cherrybark oak; swamp red o.	Quercus pagoda	NSL	Medium	29.3	78.3	4.4	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	31
eastern cottonwood	Populus deltoides	NSH	Low	10.1	73.8	7.5	Sm. dec.	Sm. dec.	Medium	Common	Poor	Poor	Infill +	Infill +	0	32
southern red oak	Quercus falcata	WDL	Medium	16.3	71.3	3.3	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good	Infill ++	Infill ++	1	33
black walnut	Juglans nigra	WDH	Low	33.8	67.7	2.1	No change	No change	Medium	Common	Fair	Fair			1	34
black willow	Salix nigra	NSH	Low	12.2	61.8	6.9	Lg. inc.	Lg. inc.	Low	Common	Good	Good			1	35
bitternut hickory	Carya cordiformis	WSL	Low	21.1	61.1	2.8	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	36
American beech	Fagus grandifolia	WDH	High	16.6	55.7	2.8	Sm. inc.	Lg. inc.	Medium	Common	Good	Very Good	Infill ++	Infill ++	2	37
chinkapin oak	Quercus muehlenbergii	NSL	Medium	10.7	52.9	1.9	Sm. dec.	Sm. dec.	Medium	Common	Poor	Poor	Infill +	Infill +	0	38
pin oak	Quercus palustris	NSH	Low	18.7	42.5	4.0	Sm. dec.	Sm. dec.	Low	Rare	Very Poor	Very Poor			0	39
honeylocust	Gleditsia triacanthos	NSH	Low	11.7	41.8	4.0	Sm. inc.	Lg. inc.	High	Rare	Good	Good			1	40
scarlet oak	Quercus coccinea	WDL	Medium	17.1	41.0	2.6	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	41
river birch	Betula nigra	NSL	Low	14.4	37.4	4.2	Sm. dec.	Sm. inc.	Medium	Rare	Very Poor	Fair			1	42
loblolly pine	Pinus taeda	WDH	High	2.7	27.5	8.6	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	2	43
eastern hophornbeam; ironw	Ostrya virginiana	WSL	Low	17.1	25.4	1.4	Lg. inc.	Lg. inc.	High	Rare	Good	Good			1	44
pawpaw	Asimina triloba	NSL	Low	9.3	25.3	3.0	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	45
red mulberry	Morus rubra	NSL	Low	21.9	22.2	1.4	No change	Sm. inc.	Medium	Rare	Poor	Fair			1	46
eastern redbud	Cercis canadensis	NSL	Low	16.5	21.2	1.0	No change	Sm. inc.	Medium	Rare	Poor	Fair			1	47

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Common Name	Scientific Name	Range	MR	%Cell	FIAsum	FIAiv	ChngCl45	ChngCl85	Adap	Abund	Capabil45	Capabil85	SHIFT45	SHIFT85	SSO	N
eastern white pine	Pinus strobus	WDH	High	8	18.6	4.5	Lg. dec.	Lg. dec.	Low	Rare	Very Poor	Very Poor			0	48
American hornbeam; musclev	Carpinus caroliniana	WSL	Low	5.4	17.8	1.6	Sm. inc.	Sm. inc.	Medium	Rare	Fair	Fair	Infill +	Infill +	1	49
black hickory	Carya texana	NDL	High	6.5	16.4	2.5	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	2	50
sugarberry	Celtis laevigata	NDH	Medium	13	14.7	2.0	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	1	51
shellbark hickory	Carya laciniosa	NSL	Low	9.3	14.1	1.7	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	52
chestnut oak	Quercus prinus	NDH	High	2.2	14.0	1.4	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor			0	53
pecan	Carya illinoensis	NSH	Low	9	13.7	3.0	Lg. inc.	Lg. inc.	Low	Rare	Fair	Fair	Infill +	Infill +	2	54
white mulberry	Morus alba	NSL	FIA	2.3	11.2	3.2	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	55
pumpkin ash	Fraxinus profunda	NSH	FIA	1.1	11.0	8.6	Unknown	Unknown	NA	Rare	FIA Only	FIA Only			0	56
northern catalpa	Catalpa speciosa	NSHX	FIA	3.8	11.0	4.6	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	57
blackjack oak	Quercus marilandica	NSL	Medium	5.8	10.2	1.8	Lg. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	Infill ++	2	58
sourwood	Oxydendrum arboreum	NDL	High	2	7.7	1.4	No change	No change	High	Rare	Fair	Fair		Infill +	2	59
water tupelo	Nyssa aquatica	NSH	Medium	2.2	7.2	8.4	Sm. dec.	Sm. dec.	Low	Rare	Very Poor	Very Poor			0	60
Shumard oak	Quercus shumardii	NSL	Low	1.5	5.4	1.5	Sm. inc.	Lg. inc.	High	Rare	Good	Good			2	61
ailanthus	Ailanthus altissima	NSL	FIA	2.6	5.3	1.2	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	62
swamp white oak	Quercus bicolor	NSL	Low	6.1	5.2	1.3	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	63
paulownia	Paulownia tomentosa	NSL	FIA	1.2	2.7	2.2	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	64
swamp chestnut oak	Quercus michauxii	NSL	Low	2.7	2.7	1.6	No change	Sm. inc.	Medium	Rare	Poor	Fair	Infill +	Infill +	2	65
Ohio buckeye	Aesculus glabra	NSL	Low	1.2	2.5	2.1	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	66
overcup oak	Quercus lyrata	NSL	Medium	1.2	2.0	1.7	Lg. inc.	Lg. inc.	Low	Rare	Fair	Fair	Infill +	Infill +	2	67
bald cypress	Taxodium distichum	NSH	Medium	4	1.7	5.1	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	68
bur oak	Quercus macrocarpa	NDH	Medium	3.2	1.4	0.8	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor			0	69
serviceberry	Amelanchier spp.	NSL	Low	3	1.4	0.5	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	70
water hickory	Carya aquatica	NSL	Medium	1.1	1.3	1.1	No change	No change	Medium	Rare	Poor	Poor		Infill +	2	71
black maple	Acer nigrum	NSH	Low	0.7	0.9	0.6	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor			0	72
bigtooth aspen	Populus grandidentata	NSL	Medium	0.6	0.8	1.4	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	73
yellow buckeye	Aesculus flava	NSL	Low	1.1	0.7	0.5	Very Lg. dec.	Very Lg. dec.	Low	Rare	Lost	Lost			0	74
American chestnut	Castanea dentata	NSLX	FIA	0.3	0.6	0.5	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	75
Scots pine	Pinus sylvestris	NSH	FIA	2.2	0.5	0.4	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	76
butternut	Juglans cinerea	NSLX	FIA	0.5	0.1	0.2	Unknown	Unknown	Low	Rare	FIA Only	FIA Only			0	77
willow oak	Quercus phellos	NSL	Low	1.7	0.1	0.3	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	78
ashe juniper	Juniperus ashei	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			0	79
florida maple	Acer barbatum	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat		Migrate +	3	80
striped maple	Acer pensylvanicum	NSL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	81
mountain maple	Acer spicatum	NSL	Low	0	0	0	Unknown	Unknown	High	Absent	Unknown	Unknown			0	82
cittamwood/gum bumelia	Sideroxylon lanuginosum ssp.	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat		Migrate ++	3	83
black ash	Fraxinus nigra	WSH	Medium	0	0	0	Unknown	Unknown	Low	Absent	Unknown	Unknown			0	84
Osage-orange	Maclura pomifera	NDH	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Likely +	Likely +	3	85
cucumbertree	Magnolia acuminata	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	86
bigleaf magnolia	Magnolia macrophylla	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	87
redbay	Persea borbonia	NSL	Low	0	0	0	Unknown	Unknown	High	Absent	Unknown	Unknown			0	88
water elm	Planera aquatica	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +	3	89
pin cherry	Prunus pensylvanica	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	90
water oak	Quercus nigra	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate ++	3	91
Nuttall oak	Quercus texana	NSH	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			0	92
live oak	Quercus virginiana	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			0	93
American basswood	Tilia americana	WSL	Medium	0	0	0	Unknown	Unknown	Medium	Modeled	Unknown	Unknown			0	94

HUC 051402 Lower Ohio

HUC 6 Watershed

Climate Change Atlas Tree Species

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

Common Name	Scientific Name	Range	MR	%Cell	FIAsum	FIAiv	ChngCl45	ChngCl85	Adap	Abund	Capabil45	Capabil85	SHIFT45	SHIFT85	SSO	N
cedar elm	Ulmus crassifolia	NDH	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat		Migrate ++	3	95