

Current and Potential Future Habitat, Capability, and Migration

	sq. km	sq. mi	FIA Plots
Area of Region	37,812	14,599	1,150

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	27	RCP45	RCP85	RCP45	RCP85	RCP45	RCP85		
Ash	5			19	27	Increase	28	31	Very Good	7	9		
Hickory	8			34	53	No Change	16	14	Good	24	25		
Maple	5	Abundant	2	Low	37	15	Decrease	27	26	Fair	9	6	
Oak	16	Common	32	FIA	11		New	14	14	Poor	15	18	
Pine	5	Rare	48				Unknown	16	16	Very Poor	15	12	
Other	43	Absent	17							FIA Only	6	6	
										Unknown	5	5	
	82		99		101	95		101	101		81	81	
											Likely	2	2
											Infill	15	17
											Migrate	4	6
												21	25

Potential Changes in Climate Variables

Temperature (°F)

Scenario	2009	2039	2069	2099		
Annual	CCSM45	54.2	55.9	58.2	58.5	
Average	CCSM85	54.2	56.5	59.1	62.1	
	GFDL45	54.2	57.8	59.6	60.4	
	GFDL85	54.2	57.2	60.5	64.5	
	HAD45	54.2	57.0	60.4	61.9	
	HAD85	54.2	57.4	62.0	66.4	
Growing	CCSM45	70.8	72.6	74.4	75.2	
Season	CCSM85	70.8	73.2	75.8	79.6	
May—Sep	GFDL45	70.8	75.0	77.1	78.5	
	GFDL85	70.8	74.4	78.5	83.1	
	HAD45	70.8	74.0	77.3	79.2	
	HAD85	70.8	74.5	80.7	85.0	
Coldest	CCSM45	28.0	29.4	31.1	31.5	
Month	CCSM85	28.0	30.9	31.9	33.6	
Average	GFDL45	28.0	32.2	32.5	33.0	
	GFDL85	28.0	30.8	31.8	32.5	
	HAD45	28.0	29.4	31.9	32.0	
	HAD85	28.0	30.7	32.9	34.9	
Warmest	CCSM45	76.3	78.1	79.3	80.0	
Month	CCSM85	76.3	78.9	80.7	82.5	
Average	GFDL45	76.3	79.6	81.3	82.3	
	GFDL85	76.3	80.1	82.5	85.3	
	HAD45	76.3	80.2	82.8	83.8	
	HAD85	76.3	82.0	86.1	88.6	

Precipitation (in)

Scenario	2009	2039	2069	2099		
Annual	CCSM45	45.8	45.3	49.4	48.0	
Total	CCSM85	45.8	47.5	48.4	51.3	
	GFDL45	45.8	52.1	54.6	56.9	
	GFDL85	45.8	50.2	55.7	58.5	
	HAD45	45.8	47.4	49.7	48.9	
	HAD85	45.8	47.6	45.3	49.5	
Growing	CCSM45	20.5	19.6	21.0	20.0	
Season	CCSM85	20.5	19.7	19.3	19.9	
May—Sep	GFDL45	20.5	23.2	22.7	23.4	
	GFDL85	20.5	21.9	22.7	23.0	
	HAD45	20.5	20.2	18.8	19.0	
	HAD85	20.5	20.1	16.3	16.6	

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
sugar maple	Acer saccharum	WDH	High	76.3	980.9	13.4	Sm. dec.	Sm. dec.	High	Abundant	Good	Good			1	1
yellow-poplar	Liriodendron tulipifera	WDH	High	62.7	580.3	10.2	Lg. dec.	Lg. dec.	High	Abundant	Good	Good			1	2
white ash	Fraxinus americana	WDL	Medium	68.8	442.7	6.5	No change	No change	Low	Common	Poor	Poor			0	3
red maple	Acer rubrum	WDH	High	59.1	413.7	7.7	Sm. dec.	Sm. dec.	High	Common	Fair	Fair			1	4
white oak	Quercus alba	WDH	Medium	54.7	411.0	8.0	No change	No change	High	Common	Good	Good			1	5
sassafras	Sassafras albidum	WSL	Low	66.9	358.9	5.8	Sm. dec.	Sm. dec.	Medium	Common	Poor	Poor			0	6
black oak	Quercus velutina	WDH	High	47.1	280.8	6.6	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	7
eastern redcedar	Juniperus virginiana	WDH	Medium	36.2	274.6	7.0	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	8
black cherry	Prunus serotina	WDL	Medium	66.2	270.3	4.6	No change	No change	Low	Common	Poor	Poor			0	9
American elm	Ulmus americana	WDH	Medium	73.3	246.1	3.8	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	10
American beech	Fagus grandifolia	WDH	High	52.7	245.9	4.9	Sm. dec.	Lg. dec.	Medium	Common	Poor	Poor			0	11
shagbark hickory	Carya ovata	WSL	Medium	58.2	228.8	4.3	Sm. dec.	Sm. dec.	Medium	Common	Poor	Poor			0	12
sweetgum	Liquidambar styraciflua	WDH	High	30.4	225.5	7.9	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	13
pignut hickory	Carya glabra	WDL	Medium	49.1	223.5	4.9	No change	Sm. dec.	Medium	Common	Fair	Poor			1	14
sycamore	Platanus occidentalis	NSL	Low	46.9	188.6	4.6	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	15
black walnut	Juglans nigra	WDL	Low	51.6	186.2	3.9	No change	Sm. inc.	Medium	Common	Fair	Good			1	16
northern red oak	Quercus rubra	WDH	Medium	49.7	169.9	3.7	No change	No change	High	Common	Good	Good			1	17
silver maple	Acer saccharinum	NSH	Low	18.5	161.7	10.3	No change	No change	High	Common	Good	Good	Infill ++	Infill ++	1	18
black locust	Robinia pseudoacacia	NDH	Low	24.2	147.6	6.3	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	19
hackberry	Celtis occidentalis	WDH	Medium	40.1	134.2	3.7	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good			1	20
blackgum	Nyssa sylvatica	WDL	Medium	39.9	121.3	3.0	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good			1	21
green ash	Fraxinus pennsylvanica	WSH	Low	31.2	108.6	4.8	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	22
bitternut hickory	Carya cordiformis	WSL	Low	38	106.0	3.1	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good			1	23
slippery elm	Ulmus rubra	WSL	Low	40.3	101.2	2.2	Sm. inc.	Lg. inc.	Medium	Common	Good	Very Good			1	24
boxelder	Acer negundo	WSH	Low	34.4	100.3	3.9	Sm. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	25
chinkapin oak	Quercus muehlenbergii	NSL	Medium	25.9	90.1	2.9	No change	No change	Medium	Common	Fair	Fair			1	26
Virginia pine	Pinus virginiana	NDH	High	14.7	89.2	7.1	Sm. dec.	Sm. dec.	Medium	Common	Poor	Poor			0	27
pin oak	Quercus palustris	NSH	Low	20.5	83.0	5.3	No change	No change	Low	Common	Poor	Poor	Infill +	Infill +	0	28
chestnut oak	Quercus prinus	NDH	High	8.3	81.4	8.4	Sm. dec.	Sm. dec.	High	Common	Fair	Fair	Infill +	Infill +	2	29
shingle oak	Quercus imbricaria	NDH	Medium	14.6	65.1	6.1	No change	Sm. dec.	Medium	Common	Fair	Poor	Infill +	Infill +	1	30
eastern white pine	Pinus strobus	WDH	High	9.6	58.5	6.3	Lg. dec.	Lg. dec.	Low	Common	Very Poor	Very Poor			0	31
flowering dogwood	Cornus florida	WDL	Medium	41.3	56.9	1.5	Sm. inc.	No change	Medium	Common	Good	Fair			1	32
Osage-orange	Maclura pomifera	NDH	Medium	10.7	54.1	5.9	No change	Lg. inc.	High	Common	Good	Very Good	Infill ++	Infill ++	1	33
black willow	Salix nigra	NSH	Low	8.4	51.8	11.3	No change	No change	Low	Common	Poor	Poor	Infill +	Infill +	0	34
eastern cottonwood	Populus deltoides	NSH	Low	15.7	49.0	4.9	Sm. dec.	No change	Medium	Rare	Very Poor	Poor		Infill +	1	35
common persimmon	Diospyros virginiana	NSL	Low	21.7	44.6	2.3	Lg. inc.	Lg. inc.	High	Rare	Good	Good			1	36
honeylocust	Gleditsia triacanthos	NSH	Low	14.9	42.7	3.3	Sm. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	Infill ++	1	37
eastern redbud	Cercis canadensis	NSL	Low	25.7	38.3	1.4	No change	Sm. inc.	Medium	Rare	Poor	Fair			1	38
scarlet oak	Quercus coccinea	WDL	Medium	10.2	29.7	2.4	No change	Sm. dec.	Medium	Rare	Poor	Very Poor	Infill +		1	39
American hornbeam; musclev	Carpinus caroliniana	WSL	Low	21.2	26.1	1.2	Sm. inc.	Lg. inc.	Medium	Rare	Fair	Good			1	40
eastern hophornbeam; ironw	Ostrya virginiana	WSL	Low	17.3	25.3	1.1	Lg. inc.	Lg. inc.	High	Rare	Good	Good			1	41
pawpaw	Asimina triloba	NSL	Low	15.6	24.7	1.7	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	42
shortleaf pine	Pinus echinata	WDH	High	4.5	23.7	5.2	Sm. inc.	Lg. inc.	Medium	Rare	Fair	Good	Infill +	Infill ++	2	43
Ohio buckeye	Aesculus glabra	NSL	Low	11.5	22.1	1.8	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	44
river birch	Betula nigra	NSL	Low	6.9	20.9	4.1	Sm. dec.	No change	Medium	Rare	Very Poor	Poor		Infill +	1	45
red pine	Pinus resinosa	NSH	Medium	2.5	19.2	6.4	Lg. dec.	Lg. dec.	Low	Rare	Very Poor	Very Poor			2	46
post oak	Quercus stellata	WDH	High	4.1	15.6	2.1	Lg. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	Infill ++	2	47

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Common Name	Scientific Name	Range	MR	%Cell	FIAsum	FIAiv	ChngCl45	ChngCl85	Adap	Abund	Capabil45	Capabil85	SHIFT45	SHIFT85	SSO	N
American basswood	Tilia americana	WSL	Medium	10.3	15.4	1.8	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	48
bigtooth aspen	Populus grandidentata	NSL	Medium	9.3	14.1	1.8	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	49
mockernut hickory	Carya alba	WDL	Medium	6.4	13.6	1.8	Lg. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	Infill ++	1	50
winged elm	Ulmus alata	WDL	Medium	5	13.3	2.0	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	2	51
ailanthus	Ailanthus altissima	NSL	FIA	4.4	12.7	1.6	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	52
swamp chestnut oak	Quercus michauxii	NSL	Low	1.7	9.0	4.7	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	53
swamp white oak	Quercus bicolor	NSL	Low	3.1	8.3	2.7	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	54
shellbark hickory	Carya laciniosa	NSL	Low	2.6	8.2	2.7	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	55
red mulberry	Morus rubra	NSL	Low	12.1	7.8	1.2	No change	Lg. inc.	Medium	Rare	Poor	Good	Infill +	Infill ++	1	56
northern catalpa	Catalpa speciosa	NSHX	FIA	5	7.4	2.4	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	57
blue ash	Fraxinus quadrangulata	NSL	Low	4	7.4	1.6	Sm. dec.	Sm. dec.	Low	Rare	Very Poor	Very Poor			0	58
pecan	Carya illinoensis	NSH	Low	1.4	5.7	2.4	Lg. inc.	Lg. inc.	Low	Rare	Fair	Fair	Infill +	Infill +	2	59
Siberian elm	Ulmus pumila	NDH	FIA	1.9	5.6	5.7	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	60
white mulberry	Morus alba	NSL	FIA	2.2	4.6	2.5	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	61
Kentucky coffeetree	Gymnocladus dioicus	NSLX	FIA	1.5	3.1	1.9	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	62
black maple	Acer nigrum	NSH	Low	1	3.0	2.4	Lg. dec.	Lg. dec.	High	Rare	Poor	Poor			0	63
Shumard oak	Quercus shumardii	NSL	Low	0.7	2.9	2.0	Sm. inc.	Lg. inc.	High	Rare	Good	Good			2	64
bur oak	Quercus macrocarpa	NDH	Medium	2.9	2.9	1.0	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor		Infill +	2	65
northern pin oak	Quercus ellipsoidalis	NSH	Medium	0.3	2.7	10.2	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor			0	66
cherrybark oak; swamp red o.	Quercus pagoda	NSL	Medium	1.7	2.2	2.8	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	67
sugarberry	Celtis laevigata	NDH	Medium	0.2	1.6	0.5	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	68
rock elm	Ulmus thomasii	NSLX	FIA	2.1	1.2	1.3	Unknown	Unknown	Low	Rare	FIA Only	FIA Only			0	69
serviceberry	Amelanchier spp.	NSL	Low	0.8	0.8	0.5	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	70
pumpkin ash	Fraxinus profunda	NSH	FIA	0.3	0.7	2.7	Unknown	Unknown	NA	Rare	FIA Only	FIA Only			0	71
Scots pine	Pinus sylvestris	NSH	FIA	1.1	0.7	0.6	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	72
Norway spruce	Picea abies	NSH	FIA	0.3	0.7	2.5	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	73
wild plum	Prunus americana	NSLX	FIA	0.3	0.4	1.7	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	74
yellow buckeye	Aesculus flava	NSL	Low	0	0.2	0.1	Very Lg. dec.	Very Lg. dec.	Low	Rare	Lost	Lost			0	75
butternut	Juglans cinerea	NSLX	FIA	0.5	0.2	0.4	Unknown	Unknown	Low	Rare	FIA Only	FIA Only			0	76
water hickory	Carya aquatica	NSL	Medium	0	0.2	0.1	Sm. dec.	No change	Medium	Rare	Very Poor	Poor			0	77
black ash	Fraxinus nigra	WSH	Medium	0.2	0.2	0.5	Lg. dec.	Sm. dec.	Low	Rare	Very Poor	Very Poor			0	78
black hickory	Carya texana	NDL	High	0.3	0.2	0.6	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	79
sourwood	Oxydendrum arboreum	NDL	High	0.3	0.1	0.5	Lg. inc.	Lg. inc.	High	Rare	Good	Good			2	80
blackjack oak	Quercus marilandica	NSL	Medium	0.2	0.1	0.5	Lg. inc.	Lg. inc.	High	Rare	Good	Good			2	81
bald cypress	Taxodium distichum	NSH	Medium	1.1	0.1	1.1	Lg. dec.	No change	Medium	Rare	Very Poor	Poor			0	82
ashe juniper	Juniperus ashei	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			0	83
red spruce	Picea rubens	NDH	High	0	0	0	Unknown	Unknown	Low	Absent	Unknown	Unknown			0	84
loblolly pine	Pinus taeda	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate ++	Migrate ++	3	85
striped maple	Acer pensylvanicum	NSL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Likely +	Likely +	3	86
mountain maple	Acer spicatum	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			3	87
yellow birch	Betula alleghaniensis	NDL	High	0	0	0	Unknown	Unknown	Medium	Modeled	Unknown	Unknown			0	88
cittamwood/gum bumelia	Sideroxylon lanuginosum ssp.	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat		Migrate ++	3	89
American holly	Ilex opaca	NSL	Medium	0	0	0	Unknown	Unknown	Medium	Modeled	Unknown	Unknown			0	90
bigleaf magnolia	Magnolia macrophylla	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	91
water elm	Planera aquatica	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +	3	92
pin cherry	Prunus pensylvanica	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	93
southern red oak	Quercus falcata	WDL	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Likely +	Likely +	3	94

CentralHardwood IN

NIACS EVAS Region Climate Change Atlas Tree Species

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

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Common Name	Scientific Name	Range	MR	%Cell	FIAsum	FIAiv	ChngCl45	ChngCl85	Adap	Abund	Capabil45	Capabil85	SHIFT45	SHIFT85	SSO	N
overcup oak	Quercus lyrata	NSL	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	95
water oak	Quercus nigra	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate ++	3	96
nuttall oak	Quercus texana	NSH	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			0	97
willow oak	Quercus phellos	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate ++	3	98
live oak	Quercus virginiana	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			0	99
bluejack oak	Quercus incana	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	100
cedar elm	Ulmus crassifolia	NDH	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat			3	101