

Climate Change Atlas Tree Species  
Current and Potential Future Habitat, Capability, and Migration

Area of Region    sq. km    sq. mi    FIA Plots  
150,454    58,091    4,299

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	RCP45	RCP85	RCP45	RCP85		
Ash	3			Medium	32	No Change	25	18	Good	13	18	Likely	0	0
Hickory	4			Low	33	Decrease	21	22	Fair	16	14	Infill	22	25
Maple	7	Abundant	4	FIA	11	New	19	21	Poor	18	18	Migrate	4	5
Oak	11	Common	28			Unknown	16	14	Very Poor	13	9		26	30
Pine	5	Rare	45						FIA Only	5	5			
Other	46	Absent	24						Unknown	5	3			
	<b>76</b>		<b>101</b>		<b>101</b>		<b>101</b>	<b>101</b>		<b>76</b>	<b>73</b>			

Potential Changes in Climate Variables

Temperature (°F)

	Scenario	2009	2039	2069	2099	
Annual Average	CCSM45	44.9	46.7	49.7	49.7	
	CCSM85	44.9	47.5	50.5	53.9	
	GFDL45	44.9	48.4	50.9	52.2	
	GFDL85	44.9	48.3	52.0	56.9	
	HAD45	44.9	48.3	51.6	53.5	
	HAD85	44.9	48.5	52.9	58.6	
Growing Season (May—Sep)	CCSM45	62.8	64.4	66.8	67.1	
	CCSM85	62.8	65.1	67.7	71.6	
	GFDL45	62.8	67.2	70.4	72.3	
	GFDL85	62.8	67.3	71.8	77.4	
	HAD45	62.8	66.2	68.6	71.0	
	HAD85	62.8	65.9	70.4	76.1	
Coldest Month (Average)	CCSM45	17.8	19.4	22.3	21.9	
	CCSM85	17.8	20.3	22.5	24.8	
	GFDL45	17.8	20.2	21.9	22.4	
	GFDL85	17.8	21.0	22.5	24.9	
	HAD45	17.8	19.7	23.5	23.6	
	HAD85	17.8	22.0	24.8	29.0	
Warmest Month (Average)	CCSM45	68.9	71.0	72.5	72.8	
	CCSM85	68.9	72.0	73.7	75.7	
	GFDL45	68.9	72.8	74.6	75.9	
	GFDL85	68.9	73.6	75.9	78.9	
	HAD45	68.9	72.8	74.0	75.7	
	HAD85	68.9	73.1	75.7	79.7	

Precipitation (in)

	Scenario	2009	2039	2069	2099	
Annual Total	CCSM45	32.8	33.0	32.5	33.4	
	CCSM85	32.8	33.2	33.0	33.8	
	GFDL45	32.8	35.2	38.1	37.7	
	GFDL85	32.8	35.5	38.9	39.9	
	HAD45	32.8	34.0	35.7	35.2	
	HAD85	32.8	35.3	34.6	37.3	
Growing Season (May—Sep)	CCSM45	16.5	16.9	16.1	16.4	
	CCSM85	16.5	16.5	16.1	15.5	
	GFDL45	16.5	17.2	18.5	18.4	
	GFDL85	16.5	17.9	18.3	18.2	
	HAD45	16.5	16.4	15.5	15.8	
	HAD85	16.5	16.7	14.1	15.0	

**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	66.5	989.3	14.0	No change	No change	High	Abundant	Very Good	Very Good			1	1
sugar maple	Acer saccharum	WDH	High	43.8	879.6	18.1	Sm. dec.	Sm. dec.	High	Abundant	Good	Good			1	2
quaking aspen	Populus tremuloides	WDH	High	45.1	577.5	11.4	No change	Sm. dec.	Medium	Abundant	Good	Fair			1	3
northern white-cedar	Thuja occidentalis	WSH	High	30.5	522.2	13.4	Sm. dec.	Sm. dec.	Medium	Abundant	Fair	Fair			0	4
red pine	Pinus resinosa	NSH	Medium	25.1	425.3	15.8	No change	Sm. dec.	Low	Common	Poor	Poor			0	5
black cherry	Prunus serotina	WDL	Medium	49.2	378.4	8.3	Sm. inc.	Sm. inc.	Low	Common	Fair	Fair			1	6
balsam fir	Abies balsamea	NDH	High	36.2	366.8	8.1	Lg. dec.	Lg. dec.	Low	Common	Very Poor	Very Poor			0	7
eastern white pine	Pinus strobus	WDH	High	33.3	303.1	8.3	No change	No change	Low	Common	Poor	Poor			0	8
green ash	Fraxinus pennsylvanica	WSH	Low	30	297.3	12.3	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	9
bigtooth aspen	Populus grandidentata	NSL	Medium	30.7	293.2	9.0	Sm. dec.	Sm. dec.	Medium	Common	Poor	Poor			0	10
northern red oak	Quercus rubra	WDH	Medium	32.7	290.9	8.8	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good			1	11
jack pine	Pinus banksiana	NSH	Medium	16.2	261.0	15.1	Sm. dec.	Sm. dec.	High	Common	Fair	Fair			1	12
American elm	Ulmus americana	WDH	Medium	37.2	204.7	6.7	Sm. inc.	Lg. inc.	Medium	Common	Good	Very Good			1	13
paper birch	Betula papyrifera	WDH	High	35.3	182.2	3.9	No change	No change	Medium	Common	Fair	Fair			1	14
white oak	Quercus alba	WDH	Medium	18.4	170.9	10.2	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good	Infill ++	Infill ++	1	15
black oak	Quercus velutina	WDH	High	15.2	155.1	10.5	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good	Infill ++	Infill ++	1	16
American basswood	Tilia americana	WSL	Medium	25.6	148.9	6.0	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	17
white spruce	Picea glauca	NSL	Medium	26	147.4	4.5	Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor			0	18
black spruce	Picea mariana	NSH	High	20.6	137.3	5.6	Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor	Infill +	Infill +	0	19
eastern hemlock	Tsuga canadensis	NSH	High	19.6	136.3	5.9	No change	Sm. dec.	Low	Common	Poor	Poor	Infill +	Infill +	0	20
white ash	Fraxinus americana	WDL	Medium	23.3	127.0	5.6	Sm. inc.	Lg. inc.	Low	Common	Fair	Good			1	21
silver maple	Acer saccharinum	NSH	Low	10	121.1	15.5	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good	Infill ++	Infill ++	1	22
black ash	Fraxinus nigra	WSH	Medium	24.9	118.3	4.2	No change	No change	Low	Common	Poor	Poor			0	23
yellow birch	Betula alleghaniensis	NDL	High	22.4	110.1	4.0	Sm. dec.	Sm. dec.	Medium	Common	Poor	Poor			0	24
American beech	Fagus grandifolia	WDH	High	19.6	107.5	4.9	Sm. inc.	Sm. inc.	Medium	Common	Good	Good	Infill ++	Infill ++	1	25
Scots pine	Pinus sylvestris	NSH	FIA	6.7	104.9	19.4	Unknown	Unknown	NA	Common	NNIS	NNIS			0	26
northern pin oak	Quercus ellipsoidalis	NSH	Medium	10.4	97.8	9.1	Sm. inc.	No change	High	Common	Very Good	Good	Infill ++	Infill ++	1	27
tamarack (native)	Larix laricina	NSH	High	14	95.3	6.0	Sm. inc.	Sm. inc.	Low	Common	Fair	Fair	Infill +	Infill +	1	28
balsam poplar	Populus balsamifera	NSH	Medium	12.4	75.4	4.9	Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor	Infill +	Infill +	0	29
eastern cottonwood	Populus deltoides	NSH	Low	6.6	67.3	15.3	No change	No change	Medium	Common	Fair	Fair	Infill +	Infill +	1	30
sassafras	Sassafras albidum	WSL	Low	8.3	52.5	6.8	No change	No change	Medium	Common	Fair	Fair	Infill +	Infill +	1	31
eastern hophornbeam; ironw	Ostrya virginiana	WSL	Low	22.1	50.8	2.2	No change	No change	High	Common	Good	Good			1	32
boxelder	Acer negundo	WSH	Low	5.6	36.7	9.6	No change	No change	High	Rare	Fair	Fair	Infill +	Infill +	2	33
black walnut	Juglans nigra	WDH	Low	5	34.8	11.4	No change	Sm. inc.	Medium	Rare	Poor	Fair	Infill +	Infill +	2	34
shagbark hickory	Carya ovata	WSL	Medium	6	30.0	7.4	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	35
bitternut hickory	Carya cordiformis	WSL	Low	4.7	24.9	7.1	No change	No change	High	Rare	Fair	Fair	Infill +	Infill +	2	36
swamp white oak	Quercus bicolor	NSL	Low	4.5	24.4	6.8	Sm. inc.	No change	Medium	Rare	Fair	Poor	Infill +	Infill +	2	37
slippery elm	Ulmus rubra	WSL	Low	3.4	21.3	7.2	Sm. dec.	No change	Medium	Rare	Very Poor	Poor		Infill +	2	38
black willow	Salix nigra	NSH	Low	3.2	20.9	8.9	No change	No change	Low	Rare	Very Poor	Very Poor			2	39
bur oak	Quercus macrocarpa	NDH	Medium	4.8	19.8	7.7	No change	Sm. inc.	High	Rare	Fair	Good	Infill +		2	40
black locust	Robinia pseudoacacia	NDH	Low	1.6	16.3	11.4	Sm. inc.	Lg. inc.	Medium	Rare	Fair	Good	Infill +	Infill ++	2	41
serviceberry	Amelanchier spp.	NSL	Low	10.1	15.6	1.3	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	42
Norway spruce	Picea abies	NSH	FIA	1.2	14.5	12.1	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	43
pignut hickory	Carya glabra	WDL	Medium	2.9	13.1	5.4	No change	Sm. inc.	Medium	Rare	Poor	Fair	Infill +	Infill +	2	44
American hornbeam; musclev	Carpinus caroliniana	WSL	Low	6.2	9.6	2.1	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	45
pin cherry	Prunus pensylvanica	NSL	Low	3.6	9.2	2.3	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	46
pin oak	Quercus palustris	NSH	Low	0.7	8.9	7.0	No change	Sm. inc.	Low	Rare	Very Poor	Poor		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
yellow-poplar	Liriodendron tulipifera	WDH	High	1.4	8.6	7.6	Sm. inc.	Lg. inc.	High	Rare	Good	Good			2	48
Siberian elm	Ulmus pumila	NDH	FIA	1	7.9	8.9	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	49
white mulberry	Morus alba	NSL	FIA	1.7	7.6	5.3	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	50
northern catalpa	Catalpa speciosa	NSHX	FIA	0.2	7.5	20.0	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	51
scarlet oak	Quercus coccinea	WDL	Medium	0.1	7.2	54.1	No change	No change	Medium	Rare	Poor	Poor		Infill +	2	52
peachleaf willow	Salix amygdaloides	NSLX	FIA	1.5	6.7	5.2	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	53
hackberry	Celtis occidentalis	WDH	Medium	1.3	5.5	6.3	Sm. inc.	Lg. inc.	High	Rare	Good	Good			2	54
blackgum	Nyssa sylvatica	WDL	Medium	1.6	4.9	3.5	Sm. inc.	Lg. inc.	High	Rare	Good	Good			2	55
chokecherry	Prunus virginiana	NSLX	FIA	3.8	4.7	1.3	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	56
eastern redcedar	Juniperus virginiana	WDH	Medium	1.1	4.2	3.7	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	57
mountain maple	Acer spicatum	NSL	Low	2.3	2.7	0.7	Lg. dec.	Lg. dec.	High	Rare	Poor	Poor	Infill +	Infill +	2	58
sycamore	Platanus occidentalis	NSL	Low	0.3	1.7	3.9	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	59
red mulberry	Morus rubra	NSL	Low	0.9	1.6	4.0	No change	No change	Medium	Rare	Poor	Poor		Infill +	2	60
mockernut hickory	Carya alba	WDL	Medium	0.2	1.6	5.9	No change	Lg. inc.	High	Rare	Fair	Good	Infill +		2	61
flowering dogwood	Cornus florida	WDL	Medium	0.8	1.5	1.7	Lg. dec.	No change	Medium	Rare	Very Poor	Poor		Infill +	2	62
Shumard oak	Quercus shumardii	NSL	Low	0.1	1.3	19.9	No change	No change	High	Rare	Fair	Fair		Infill +	2	63
Norway maple	Acer platanoides	NSL	FIA	0.5	1.3	5.5	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	64
loblolly pine	Pinus taeda	WDH	High	0.1	1.1	17.2	No change	Lg. inc.	Medium	Rare	Poor	Good			2	65
rock elm	Ulmus thomasii	NSLX	FIA	0.1	1.0	7.3	Unknown	Unknown	Low	Rare	FIA Only	FIA Only			0	66
ailanthus	Ailanthus altissima	NSL	FIA	0.3	1.0	9.1	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	67
black maple	Acer nigrum	NSH	Low	0.3	0.8	2.5	Lg. dec.	Lg. dec.	High	Rare	Poor	Poor			0	68
honeylocust	Gleditsia triacanthos	NSH	Low	0.3	0.6	7.3	No change	Sm. inc.	High	Rare	Fair	Good	Infill +		2	69
Osage-orange	Maclura pomifera	NDH	Medium	0	0.5	4.3	Lg. inc.	Lg. inc.	High	Rare	Good	Good			2	70
American mountain-ash	Sorbus americana	NSL	Low	0.7	0.4	0.5	Lg. dec.	Lg. dec.	Low	Rare	Very Poor	Very Poor			0	71
butternut	Juglans cinerea	NSLX	FIA	0.4	0.3	2.5	Unknown	Unknown	Low	Rare	FIA Only	FIA Only			0	72
shingle oak	Quercus imbricaria	NDH	Medium	0.1	0.3	4.6	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	73
chinkapin oak	Quercus muehlenbergii	NSL	Medium	0.3	0.1	1.5	No change	Sm. inc.	Medium	Rare	Poor	Fair			0	74
Ohio buckeye	Aesculus glabra	NSL	Low	0.3	0.1	1.2	Sm. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	75
pawpaw	Asimina triloba	NSL	Low	0.1	0.1	1.0	Lg. dec.	Very Lg. dec.	Medium	Rare	Very Poor	Lost			0	76
ash juniper	Juniperus ashei	NDH	High	0	0	0	New Habitat	New Habitat	NA	Absent	New Habitat	New Habitat			0	77
red spruce	Picea rubens	NDH	High	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat			3	78
shortleaf pine	Pinus echinata	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +	3	79
Virginia pine	Pinus virginiana	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +		3	80
striped maple	Acer pensylvanicum	NSL	Medium	0.6	0	0.1	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			2	81
sweet birch	Betula lenta	NDH	High	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat			3	82
pecan	Carya illinoensis	NSH	Low	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat			3	83
shellbark hickory	Carya laciniosa	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	84
black hickory	Carya texana	NDL	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	85
sugarberry	Celtis laevigata	NDH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	86
eastern redbud	Cercis canadensis	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			0	87
common persimmon	Diospyros virginiana	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	88
sweetgum	Liquidambar styraciflua	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	89
cucumber tree	Magnolia acuminata	NSL	Low	0	0	0	Unknown	New Habitat	Medium	Absent	Unknown	New Habitat			3	90
bigleaf magnolia	Magnolia macrophylla	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			0	91
mountain or Fraser magnolia	Magnolia fraseri	NSL	Low	0	0	0	Unknown	Unknown	NA	Absent	Unknown	Unknown			0	92
southern red oak	Quercus falcata	WDL	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			3	93
laurel oak	Quercus laurifolia	NDH	Medium	0	0	0	Unknown	New Habitat	Medium	Absent	Unknown	New Habitat			0	94

# Michigan

## States

### 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

Common Name	Scientific Name	Range	MR	%Cell	FIAsum	FIAiv	ChngCl45	ChngCl85	Adap	Abund	Capabil45	Capabil85	SHIFT45	SHIFT85	SSO	N
blackjack oak	Quercus marilandica	NSL	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			3	95
chestnut oak	Quercus prinus	NDH	High	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			3	96
post oak	Quercus stellata	WDH	High	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate ++	Migrate ++	3	97
live oak	Quercus virginiana	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			0	98
bluejack oak	Quercus incana	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	99
winged elm	Ulmus alata	WDL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate ++	3	100
cedar elm	Ulmus crassifolia	NDH	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat			0	101