

HUC 040602 Lake Michigan

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	58,205	22,473	12

Species Information

The columns below provide breif 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		Potential Change in Habitat Suitability				Capability to Cope or Persist				Migration Potential			
				Model		Scenario		Scenario				SHIFT			
		Abundance		Reliability		RCP45		RCP85		RCP45		RCP85			
Maple	1	Abundant	0	High	19	13	Increase	0	0	Very Good	0	0	Likely	20	20
Oak	3	Common	0	Medium	22	28	No Change	6	5	Good	0	0	Infill	6	6
Pine	0	Rare	10	Low	11	11	Decrease	4	5	Fair	2	2	Migrate	0	2
Other	6	Absent	38	FIA	0		New	37	38	Poor	4	4		26	28
10		48		52		52	Unknown	5	4	Very Poor	4	4			
								52	52	FIA Only	0	0			
										Unknown	5	4			
											15	14			
Potential Changes in Climate Variables															

Potential Changes in Climate Variables

Temperature (°F)

	Scenario	2009	2039	2069	2099	
Annual Average	CCSM45	32.1	32.1	32.1	32.1	
	CCSM85	32.1	32.1	32.1	32.2	
	GFDL45	32.1	32.1	32.2	32.2	
	GFDL85	32.1	32.1	32.2	32.2	
	HAD45	32.1	32.1	32.2	32.2	
	HAD85	32.1	32.1	32.2	32.2	
Growing Season May—Sep	CCSM45	32.3	32.3	32.3	32.3	
	CCSM85	32.3	32.3	32.3	32.4	
	GFDL45	32.3	32.3	32.3	32.4	
	GFDL85	32.3	32.3	32.4	32.4	
	HAD45	32.3	32.3	32.3	32.3	
	HAD85	32.3	32.3	32.3	32.4	
Coldest Month Average	CCSM45	31.8	31.8	31.9	31.9	
	CCSM85	31.8	31.9	31.9	31.9	
	GFDL45	31.8	31.8	31.9	31.9	
	GFDL85	31.8	31.8	31.9	31.9	
	HAD45	31.8	31.8	31.9	31.9	
	HAD85	31.8	31.9	31.9	31.9	
Warmest Month Average	CCSM45	32.3	32.4	32.4	32.4	
	CCSM85	32.3	32.4	32.4	32.4	
	GFDL45	32.3	32.4	32.4	32.4	
	GFDL85	32.3	32.4	32.4	32.4	
	HAD45	32.3	32.4	32.4	32.4	
	HAD85	32.3	32.4	32.4	32.4	

Precipitation (in)

	Scenario	2009	2039	2069	2099	
Annual	CCSM45	.3	.3	.3	.3	
Total	CCSM85	.3	.3	.3	.3	
	GFDL45	.3	.3	.4	.4	
	GFDL85	.3	.3	.4	.4	
	HAD45	.3	.3	.4	.3	
	HAD85	.3	.3	.4	.4	
	Growing	CCSM45	.2	.2	.2	.2
Season	CCSM85	.2	.2	.1	.1	
May—Sep	GFDL45	.2	.2	.2	.2	
	GFDL85	.2	.2	.2	.2	
	HAD45	.2	.2	.1	.1	
	HAD85	.2	.2	.1	.1	

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	6.9	3.0	4.1	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor	Infill +	Infill +	2	1
black willow	Salix nigra	NSH	Low	1.9	1.8	0.7	Sm. dec.	Sm. dec.	Low	Rare	Very Poor	Very Poor			0	2
American beech	Fagus grandifolia	WDH	High	6.9	1.2	1.6	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			2	3
northern red oak	Quercus rubra	WDH	Medium	1.9	0.8	0.3	No change	No change	High	Rare	Fair	Fair	Infill +	Infill +	2	4
sassafras	Sassafras albidum	WSL	Low	1.9	0.7	0.2	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			2	5
American elm	Ulmus americana	WDH	Medium	1.9	0.3	0.1	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	6
white oak	Quercus alba	WDH	Medium	1.9	0.3	0.1	No change	No change	High	Rare	Fair	Fair	Infill +	Infill +	2	7
black oak	Quercus velutina	WDH	High	1.9	0.3	0.1	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	8
eastern hemlock	Tsuga canadensis	NSH	High	6.9	0.1	0.1	No change	Sm. dec.	Low	Rare	Very Poor	Very Poor			2	9
American basswood	Tilia americana	WSL	Medium	1.9	0.1	0.0	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	10
balsam fir	Abies balsamea	NDH	High	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat	Likely +	Likely +	3	11
eastern redcedar	Juniperus virginiana	WDH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	12
tamarack (native)	Larix laricina	NSH	High	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat	Likely +	Likely +	3	13
white spruce	Picea glauca	NSL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Likely +	Likely +	3	14
jack pine	Pinus banksiana	NSH	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Likely +	Likely +	3	15
slash pine	Pinus elliotii	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			0	16
red pine	Pinus resinosa	NSH	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat	Likely +	Likely +	3	17
eastern white pine	Pinus strobus	WDH	High	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat	Likely +	Likely +	3	18
loblolly pine	Pinus taeda	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			0	19
northern white-cedar	Thuja occidentalis	WSH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Likely +	Likely +	3	20
striped maple	Acer pensylvanicum	NSL	Medium	0	0	0	Unknown	Unknown	Medium	Modeled	Unknown	Unknown			0	21
red maple	Acer rubrum	WDH	High	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Likely +	Likely +	3	22
silver maple	Acer saccharinum	NSH	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Likely +	Likely +	3	23
yellow birch	Betula alleghaniensis	NDL	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Likely +	Likely +	3	24
paper birch	Betula papyrifera	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Likely +	Likely +	3	25
pignut hickory	Carya glabra	WDL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			0	26
pecan	Carya illinoensis	NSH	Low	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat			0	27
black hickory	Carya texana	NDL	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			0	28
mockernut hickory	Carya alba	WDL	Medium	0	0	0	Unknown	New Habitat	High	Absent	Unknown	New Habitat			0	29
sugarberry	Celtis laevigata	NDH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			0	30
flowering dogwood	Cornus florida	WDL	Medium	0	0	0	Unknown	Unknown	Medium	Modeled	Unknown	Unknown			0	31
white ash	Fraxinus americana	WDL	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat	Likely +	Likely +	3	32
black ash	Fraxinus nigra	WSH	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat	Likely +	Likely +	3	33
green ash	Fraxinus pennsylvanica	WSH	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Likely +	Likely +	3	34
black walnut	Juglans nigra	WDH	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +	3	35
sweetgum	Liquidambar styraciflua	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			0	36
yellow-poplar	Liriodendron tulipifera	WDH	High	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			0	37
blackgum	Nyssa sylvatica	WDL	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			0	38
eastern hophornbeam; ironw	Ostrya virginiana	WSL	Low	0	0	0	Unknown	Unknown	High	Modeled	Unknown	Unknown			0	39
balsam poplar	Populus balsamifera	NSH	Medium	0	0	0	Unknown	Unknown	Medium	Modeled	Unknown	Unknown			2	40
eastern cottonwood	Populus deltoides	NSH	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Likely +	Likely +	3	41
bigtooth aspen	Populus grandidentata	NSL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Likely +	Likely +	3	42
quaking aspen	Populus tremuloides	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Likely +	Likely +	3	43
black cherry	Prunus serotina	WDL	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat	Likely +	Likely +	3	44
swamp white oak	Quercus bicolor	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	45
bur oak	Quercus macrocarpa	NDH	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Likely +	Likely +	3	46
blackjack oak	Quercus marilandica	NSL	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			0	47

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pin oak	Quercus palustris	NSH	Low	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat	Migrate +		3	48
post oak	Quercus stellata	WDH	High	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			0	49
live oak	Quercus virginiana	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			0	50
black locust	Robinia pseudoacacia	NDH	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Likely +	Likely +	3	51
winged elm	Ulmus alata	WDL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			0	52