

# HUC 070600 Upper Mississippi-Maquoketa-Plum 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    22,258    8,593.8    276

### 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	10	20	Increase	14	13	Very Good	8	6	Likely	0	0
Hickory	2			Medium	23	38	No Change	11	10	Good	8	9	Infill	26	26
Maple	5	Abundant	1	Low	29	9	Decrease	13	15	Fair	7	9	Migrate	7	13
Oak	7	Common	21	FIA	8		New	15	16	Poor	7	7			
Pine	3	Rare	24				Unknown	17	16	Very Poor	7	5			
Other	26	Absent	19							FIA Only	5	5			
										Unknown	9	8			
	<b>46</b>		<b>65</b>		<b>70</b>	<b>67</b>		<b>70</b>	<b>70</b>		<b>51</b>	<b>49</b>		<b>33</b>	<b>39</b>

### Potential Changes in Climate Variables

#### Temperature (°F)

Scenario	2009	2039	2069	2099		
Annual	CCSM45	43.2	44.8	46.9	47.1	
Average	CCSM85	43.2	45.4	47.5	50.1	
	GFDL45	43.2	46.4	47.4	48.4	
	GFDL85	43.2	45.7	48.3	51.9	
	HAD45	43.2	45.5	48.3	49.7	
	HAD85	43.2	45.9	49.4	53.3	
Growing Season	CCSM45	58.1	59.8	61.6	62.0	
	CCSM85	58.1	60.5	62.4	65.5	
May—Sep	GFDL45	58.1	61.9	63.1	64.7	
	GFDL85	58.1	61.2	64.2	68.5	
	HAD45	58.1	60.4	62.7	64.3	
	HAD85	58.1	60.6	64.5	68.3	
Coldest Month	CCSM45	19.2	20.7	22.7	22.9	
	CCSM85	19.2	21.3	22.7	24.4	
Average	GFDL45	19.2	21.9	23.0	23.3	
	GFDL85	19.2	22.0	23.3	24.9	
	HAD45	19.2	20.1	23.3	23.2	
	HAD85	19.2	22.7	25.3	27.7	
Warmest Month	CCSM45	62.9	64.7	65.9	66.3	
	CCSM85	62.9	65.9	67.2	68.9	
Average	GFDL45	62.9	65.4	66.6	67.9	
	GFDL85	62.9	66.3	67.7	70.7	
	HAD45	62.9	65.3	66.8	67.7	
	HAD85	62.9	66.3	68.5	71.1	

#### Precipitation (in)

Scenario	2009	2039	2069	2099		
Annual	CCSM45	26.8	26.5	26.6	26.4	
Total	CCSM85	26.8	26.1	26.8	26.8	
	GFDL45	26.8	28.9	31.7	30.4	
	GFDL85	26.8	29.7	32.1	31.6	
	HAD45	26.8	28.4	28.9	28.8	
	HAD85	26.8	28.1	27.3	29.4	
Growing Season	CCSM45	16.1	15.8	15.6	15.8	
Season	CCSM85	16.1	15.2	15.4	14.6	
May—Sep	GFDL45	16.1	16.9	18.5	17.2	
	GFDL85	16.1	17.6	18.0	17.0	
	HAD45	16.1	16.3	15.6	15.8	
	HAD85	16.1	15.9	14.1	14.3	

**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
American elm	Ulmus americana	WDH	Medium	85.1	586.8	13.9	Sm. dec.	Sm. dec.	Medium	Abundant	Fair	Fair	Infill +	Infill +	0	1
black walnut	Juglans nigra	WDH	Low	59.6	308.2	11.2	No change	No change	Medium	Common	Fair	Fair	Infill +	Infill +	1	2
boxelder	Acer negundo	WSH	Low	62.1	271.2	9.2	No change	No change	High	Common	Good	Good	Infill ++	Infill ++	1	3
northern red oak	Quercus rubra	WDH	Medium	37.5	227.1	8.4	No change	Sm. dec.	High	Common	Good	Fair	Infill ++	Infill +	1	4
American basswood	Tilia americana	WSL	Medium	52.5	220.6	7.7	Sm. dec.	Sm. dec.	Medium	Common	Poor	Poor	Infill +	Infill +	0	5
bur oak	Quercus macrocarpa	NDH	Medium	31.8	213.3	10.9	Sm. inc.	No change	High	Common	Very Good	Good	Infill ++	Infill ++	1	6
white oak	Quercus alba	WDH	Medium	39.9	211.4	8.3	Sm. inc.	No change	High	Common	Very Good	Good	Infill ++	Infill ++	1	7
black cherry	Prunus serotina	WDL	Medium	60.9	196.0	5.6	No change	Sm. dec.	Low	Common	Poor	Poor	Infill +	Infill +	0	8
sugar maple	Acer saccharum	WDH	High	36.2	177.1	8.6	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good	Infill ++	Infill ++	1	9
shagbark hickory	Carya ovata	WSL	Medium	37.3	151.3	6.7	No change	No change	Medium	Common	Fair	Fair	Infill +	Infill +	1	10
bitternut hickory	Carya cordiformis	WSL	Low	47.3	146.4	5.7	No change	No change	High	Common	Good	Good	Infill ++	Infill ++	1	11
slippery elm	Ulmus rubra	WSL	Low	61.8	142.9	4.4	No change	No change	Medium	Common	Fair	Fair	Infill +	Infill +	1	12
eastern redcedar	Juniperus virginiana	WDH	Medium	27.1	130.3	9.4	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good	Infill ++	Infill ++	1	13
silver maple	Acer saccharinum	NSH	Low	12.8	122.8	17.7	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good	Infill ++	Infill ++	1	14
white ash	Fraxinus americana	WDL	Medium	40.7	119.7	5.8	Sm. inc.	Sm. inc.	Low	Common	Fair	Fair	Infill +	Infill +	1	15
hackberry	Celtis occidentalis	WDH	Medium	42.7	78.5	4.4	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good	Infill ++	Infill ++	1	16
eastern hophornbeam; ironw	Ostrya virginiana	WSL	Low	41.8	75.7	3.9	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good	Infill ++	Infill ++	1	17
green ash	Fraxinus pennsylvanica	WSH	Low	14.9	74.0	6.0	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good	Infill ++	Infill ++	1	18
quaking aspen	Populus tremuloides	WDH	High	15.5	73.9	5.7	Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor	Infill +	Infill +	0	19
bigtooth aspen	Populus grandidentata	NSL	Medium	7.9	64.5	6.8	Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor	Infill +		2	20
black maple	Acer nigrum	NSH	Low	9.6	53.9	15.0	Sm. dec.	Lg. dec.	High	Common	Fair	Fair			0	21
eastern cottonwood	Populus deltoides	NSH	Low	9.7	50.6	7.9	No change	No change	Medium	Common	Fair	Fair	Infill +	Infill +	1	22
red mulberry	Morus rubra	NSL	Low	11.1	47.1	6.4	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	1	23
black oak	Quercus velutina	WDH	High	24.5	45.9	3.6	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	1	24
northern pin oak	Quercus ellipsoidalis	NSH	Medium	15	37.4	6.3	Lg. dec.	Lg. dec.	High	Rare	Poor	Poor			0	25
eastern white pine	Pinus strobus	WDH	High	8.4	27.8	6.2	Lg. dec.	Lg. dec.	Low	Rare	Very Poor	Very Poor			2	26
paper birch	Betula papyrifera	WDH	High	7.7	26.1	2.7	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	27
black ash	Fraxinus nigra	WSH	Medium	21.8	20.6	2.7	Lg. dec.	Very Lg. dec.	Low	Rare	Very Poor	Lost			0	28
chinkapin oak	Quercus muehlenbergii	NSL	Medium	3.2	18.2	8.5	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	29
white mulberry	Morus alba	NSL	FIA	9.1	17.2	4.8	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	30
peachleaf willow	Salix amygdaloides	NSLX	FIA	0.1	15.0	8.2	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	31
swamp white oak	Quercus bicolor	NSL	Low	1.4	14.0	6.6	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	32
white spruce	Picea glauca	NSL	Medium	0.5	12.3	5.0	Very Lg. dec.	Very Lg. dec.	Medium	Rare	Lost	Lost			0	33
black locust	Robinia pseudoacacia	NDH	Low	3.1	10.1	5.1	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	2	34
wild plum	Prunus americana	NSLX	FIA	2.7	9.8	7.5	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	35
American hornbeam; musclev	Carpinus caroliniana	WSL	Low	4.1	8.7	2.8	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	36
Scots pine	Pinus sylvestris	NSH	FIA	0.9	8.1	9.0	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	37
honeylocust	Gleditsia triacanthos	NSH	Low	4.4	6.1	4.1	Lg. inc.	Lg. inc.	High	Rare	Good	Good			2	38
red pine	Pinus resinosa	NSH	Medium	3.8	4.3	3.9	Sm. dec.	Lg. dec.	Low	Rare	Very Poor	Very Poor			0	39
Siberian elm	Ulmus pumila	NDH	FIA	3.6	3.5	15.5	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	40
butternut	Juglans cinerea	NSLX	FIA	3.5	2.8	1.4	Unknown	Unknown	Low	Rare	FIA Only	FIA Only			0	41
chokecherry	Prunus virginiana	NSLX	FIA	5.9	2.3	1.2	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	42
red maple	Acer rubrum	WDH	High	0.1	2.2	0.3	Sm. inc.	Sm. inc.	High	Rare	Good	Good			2	43
black willow	Salix nigra	NSH	Low	1.8	0.9	8.1	No change	Lg. inc.	Low	Rare	Very Poor	Fair		Infill +	2	44
river birch	Betula nigra	NSL	Low	0.5	0.8	1.9	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	45
northern catalpa	Catalpa speciosa	NSHX	FIA	1.2	0.2	1.4	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	46
striped maple	Acer pensylvanicum	NSL	Medium	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	47



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Common Name	Scientific Name	Range	MR	%Cell	FIAsum	FIAiv	ChngCl45	ChngCl85	Adap	Abund	Capabil45	Capabil85	SHIFT45	SHIFT85	SSO	N	
mountain maple	<i>Acer spicatum</i>	NSL	Low	0	0	0	Unknown	Unknown	High	Absent	Unknown	Unknown				0	48
Ohio buckeye	<i>Aesculus glabra</i>	NSL	Low	0	0	0	Unknown	Unknown	Medium	Modeled	Unknown	Unknown				0	49
serviceberry	<i>Amelanchier spp.</i>	NSL	Low	0	0	0	Unknown	Unknown	Medium	Modeled	Unknown	Unknown				0	50
pawpaw	<i>Asimina triloba</i>	NSL	Low	0	0	0	Unknown	Unknown	Medium	Modeled	Unknown	Unknown				0	51
gray birch	<i>Betula populifolia</i>	NSL	Low	0	0	0	Unknown	Unknown	Medium	Modeled	Unknown	Unknown				0	52
cittamwood/gum bumelia	<i>Sideroxylon lanuginosum ssp.</i>	NSL	Low	0	0	0	Unknown	New Habitat	High	Absent	Unknown	New Habitat				3	53
pignut hickory	<i>Carya glabra</i>	WDL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +		3	54
pecan	<i>Carya illinoensis</i>	NSH	Low	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat		Migrate ++		3	55
black hickory	<i>Carya texana</i>	NDL	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +		3	56
mockernut hickory	<i>Carya alba</i>	WDL	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +	Migrate +		3	57
sugarberry	<i>Celtis laevigata</i>	NDH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat				3	58
eastern redbud	<i>Cercis canadensis</i>	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +		3	59
flowering dogwood	<i>Cornus florida</i>	WDL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat				3	60
common persimmon	<i>Diospyros virginiana</i>	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat		Migrate +		3	61
American beech	<i>Fagus grandifolia</i>	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +		3	62
blue ash	<i>Fraxinus quadrangulata</i>	NSL	Low	0	0	0	Unknown	Unknown	Low	Absent	Unknown	Unknown				0	63
yellow-poplar	<i>Liriodendron tulipifera</i>	WDH	High	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat		Migrate +		3	64
Osage-orange	<i>Maclura pomifera</i>	NDH	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +	Migrate ++		3	65
sycamore	<i>Platanus occidentalis</i>	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +		3	66
pin cherry	<i>Prunus pensylvanica</i>	NSL	Low	0	0	0	Unknown	Unknown	Medium	Modeled	Unknown	Unknown				0	67
shingle oak	<i>Quercus imbricaria</i>	NDH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +		3	68
post oak	<i>Quercus stellata</i>	WDH	High	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +	Migrate ++		3	69
sassafras	<i>Sassafras albidum</i>	WSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +		3	70