

	sq. km	sq. mi	FIA Plots
Area of Region	45,291	17,487	652

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	23	Increase	23	24	Very Good	6	5	Likely	0	0
Hickory	4			Medium	28	44	No Change	12	9	Good	14	15	Infill	35	33
Maple	6	Abundant	0	Low	31	15	Decrease	22	24	Fair	12	14	Migrate	7	9
Oak	7	Common	25	FIA	11		New	13	14	Poor	11	6		42	42
Pine	4	Rare	43				Unknown	17	16	Very Poor	13	15			
Other	44	Absent	19							FIA Only	6	6			
	68		87		87	82		87	87	Unknown	6	5			
											68	66			

Potential Changes in Climate Variables

Temperature (°F)

	Scenario	2009	2039	2069	2099	
Annual Average	CCSM45	47.1	49.1	51.9	52.0	
	CCSM85	47.1	49.8	52.6	55.8	
	GFDL45	47.1	52.3	52.7	53.9	
	GFDL85	47.1	50.4	53.8	58.4	
	HAD45	47.1	50.1	53.6	55.4	
	HAD85	47.1	50.5	55.0	60.2	
Growing Season (May—Sep)	CCSM45	65.8	68.0	70.3	70.6	
	CCSM85	65.8	68.7	71.2	74.9	
	GFDL45	65.8	72.2	72.4	74.3	
	GFDL85	65.8	69.8	73.8	79.2	
	HAD45	65.8	69.0	71.4	73.6	
	HAD85	65.8	68.8	73.5	78.6	
Coldest Month Average	CCSM45	17.4	19.0	21.8	21.8	
	CCSM85	17.4	20.0	22.1	24.1	
	GFDL45	17.4	20.9	22.3	22.7	
	GFDL85	17.4	21.2	22.7	24.8	
	HAD45	17.4	18.7	22.8	22.9	
	HAD85	17.4	21.6	25.1	28.3	
Warmest Month Average	CCSM45	72.0	74.4	75.8	76.4	
	CCSM85	72.0	75.7	77.4	79.3	
	GFDL45	72.0	75.3	76.9	78.3	
	GFDL85	72.0	76.3	78.3	81.6	
	HAD45	72.0	75.2	76.8	78.1	
	HAD85	72.0	76.1	78.9	82.4	

Precipitation (in)

	Scenario	2009	2039	2069	2099	
Annual Total	CCSM45	34.6	34.3	34.0	34.6	
	CCSM85	34.6	34.6	34.8	35.0	
	GFDL45	34.6	37.0	40.9	40.1	
	GFDL85	34.6	38.2	42.1	41.9	
	HAD45	34.6	35.7	37.0	36.8	
	HAD85	34.6	36.7	35.1	37.7	
Growing Season (May—Sep)	CCSM45	19.4	19.4	18.9	19.3	
	CCSM85	19.4	19.0	19.1	18.2	
	GFDL45	19.4	19.9	22.4	21.6	
	GFDL85	19.4	21.2	22.1	21.2	
	HAD45	19.4	19.2	18.1	18.7	
	HAD85	19.4	19.4	16.3	16.8	

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-DGP30 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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Section 222K

EcoMap 2007
Climate Change Atlas Tree Species

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

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
black cherry	Prunus serotina	WDL	Medium	64.2	375.0	11.9	No change	Sm. dec.	Low	Common	Poor	Poor	Infill +	Infill +	0	1
American elm	Ulmus americana	WDH	Medium	57.1	295.8	7.8	Sm. inc.	Sm. inc.	Medium	Common	Good	Good	Infill ++	Infill ++	1	2
boxelder	Acer negundo	WSH	Low	50.2	285.8	12.6	Sm. dec.	Sm. dec.	High	Common	Fair	Fair	Infill +	Infill +	1	3
red pine	Pinus resinosa	NSH	Medium	16.8	278.0	18.1	Lg. dec.	Lg. dec.	Low	Common	Very Poor	Very Poor			2	4
green ash	Fraxinus pennsylvanica	WSH	Low	37.8	274.0	13.0	Sm. inc.	Sm. inc.	Medium	Common	Good	Good	Infill ++	Infill ++	1	5
eastern white pine	Pinus strobus	WDH	High	22.7	234.9	13.4	Sm. dec.	Lg. dec.	Low	Common	Poor	Very Poor	Infill +		0	6
white oak	Quercus alba	WDH	Medium	42.2	204.3	8.7	Sm. inc.	No change	High	Common	Very Good	Good	Infill ++	Infill ++	1	7
black oak	Quercus velutina	WDH	High	23.6	182.8	8.5	Sm. inc.	Sm. inc.	Medium	Common	Good	Good	Infill ++	Infill ++	1	8
red maple	Acer rubrum	WDH	High	17.7	177.7	6.8	No change	Sm. dec.	High	Common	Good	Fair	Infill ++	Infill +	1	9
bur oak	Quercus macrocarpa	NDH	Medium	40.4	156.0	9.6	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good	Infill ++	Infill ++	1	10
American basswood	Tilia americana	WSL	Medium	30.7	150.8	9.1	No change	No change	Medium	Common	Fair	Fair	Infill +	Infill +	1	11
northern red oak	Quercus rubra	WDH	Medium	35.7	129.2	6.5	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good	Infill ++	Infill ++	1	12
sugar maple	Acer saccharum	WDH	High	15.6	120.7	9.8	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good	Infill ++	Infill ++	2	13
shagbark hickory	Carya ovata	WSL	Medium	36.5	117.7	6.2	No change	No change	Medium	Common	Fair	Fair	Infill +	Infill +	1	14
white ash	Fraxinus americana	WDL	Medium	24.1	115.9	6.5	Sm. inc.	Sm. inc.	Low	Common	Fair	Fair	Infill +	Infill +	1	15
quaking aspen	Populus tremuloides	WDH	High	20.2	108.5	7.0	No change	No change	Medium	Common	Fair	Fair	Infill +	Infill +	1	16
black walnut	Juglans nigra	WDH	Low	23.6	107.4	9.4	Sm. inc.	Sm. inc.	Medium	Common	Good	Good	Infill ++	Infill ++	1	17
northern pin oak	Quercus ellipsoidalis	NSH	Medium	17.8	101.1	6.8	Sm. dec.	Sm. dec.	High	Common	Fair	Fair	Infill +	Infill +	2	18
tamarack (native)	Larix laricina	NSH	High	6.6	87.6	11.6	Sm. dec.	Sm. dec.	Low	Common	Poor	Poor	Infill +	Infill +	2	19
black locust	Robinia pseudoacacia	NDH	Low	8.3	81.7	14.7	No change	No change	Medium	Common	Fair	Fair	Infill +	Infill +	1	20
black willow	Salix nigra	NSH	Low	9.6	81.5	16.6	Sm. dec.	No change	Low	Common	Poor	Poor	Infill +	Infill +	2	21
silver maple	Acer saccharinum	NSH	Low	11.4	74.8	10.8	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good	Infill ++	Infill ++	2	22
black ash	Fraxinus nigra	WSH	Medium	12.6	71.9	5.4	Lg. dec.	Lg. dec.	Low	Common	Very Poor	Very Poor			0	23
eastern redcedar	Juniperus virginiana	WDH	Medium	10.2	63.6	7.0	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good	Infill ++	Infill ++	2	24
Scots pine	Pinus sylvestris	NSH	FIA	4.9	57.5	11.3	Unknown	Unknown	NA	Common	NNIS	NNIS			0	25
northern white-cedar	Thuja occidentalis	WSH	High	4.7	48.7	10.6	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			2	26
jack pine	Pinus banksiana	NSH	Medium	3.8	45.4	7.2	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor	Infill +	Infill +	2	27
bitternut hickory	Carya cordiformis	WSL	Low	16	45.2	5.3	Sm. inc.	Sm. inc.	High	Rare	Good	Good	Infill ++	Infill ++	1	28
white spruce	Picea glauca	NSL	Medium	6.6	44.6	9.0	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	29
hackberry	Celtis occidentalis	WDH	Medium	13.5	42.7	5.1	Lg. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	Infill ++	2	30
bigtooth aspen	Populus grandidentata	NSL	Medium	4.5	42.2	6.1	No change	Sm. dec.	Medium	Rare	Poor	Very Poor	Infill +		2	31
slippery elm	Ulmus rubra	WSL	Low	22	40.9	3.2	Sm. inc.	Sm. inc.	Medium	Rare	Fair	Fair	Infill +	Infill +	1	32
paper birch	Betula papyrifera	WDH	High	6.5	34.4	3.6	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	33
eastern cottonwood	Populus deltoides	NSH	Low	12.3	33.7	9.8	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	2	34
eastern hophornbeam; ironw	Ostrya virginiana	WSL	Low	11.5	24.1	2.5	Lg. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	Infill ++	2	35
red mulberry	Morus rubra	NSL	Low	10.3	21.2	3.9	Sm. inc.	Sm. inc.	Medium	Rare	Fair	Fair	Infill +	Infill +	2	36
American beech	Fagus grandifolia	WDH	High	1.7	18.5	4.9	No change	Sm. dec.	Medium	Rare	Poor	Very Poor	Infill +		2	37
Norway spruce	Picea abies	NSH	FIA	5.2	16.9	9.0	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	38
Siberian elm	Ulmus pumila	NDH	FIA	3.1	16.6	7.2	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	39
balsam fir	Abies balsamea	NDH	High	0.7	12.4	9.2	Sm. dec.	Sm. dec.	Low	Rare	Very Poor	Very Poor			0	40
river birch	Betula nigra	NSL	Low	0.6	11.4	16.9	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	41
swamp white oak	Quercus bicolor	NSL	Low	6	10.6	4.1	No change	Sm. inc.	Medium	Rare	Poor	Fair	Infill +	Infill +	2	42
yellow birch	Betula alleghaniensis	NDL	High	1.7	9.6	2.2	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			2	43
butternut	Juglans cinerea	NSLX	FIA	1	8.5	6.0	Unknown	Unknown	Low	Rare	FIA Only	FIA Only			0	44
white mulberry	Morus alba	NSL	FIA	7	7.5	3.3	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	45
Osage-orange	Maclura pomifera	NDH	Medium	0.4	7.5	4.9	Lg. inc.	Lg. inc.	High	Rare	Good	Good			2	46
chokecherry	Prunus virginiana	NSLX	FIA	7	6.6	1.3	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			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
eastern hemlock	Tsuga canadensis	NSH	High	0.4	6.1	4.7	Lg. dec.	Very Lg. dec.	Low	Rare	Very Poor	Lost			0	48
yellow-poplar	Liriodendron tulipifera	WDH	High	0	5.1	2.5	No change	Sm. inc.	High	Rare	Fair	Good			2	49
pin cherry	Prunus pensylvanica	NSL	Low	2.5	4.1	2.7	Very Lg. dec.	Very Lg. dec.	Medium	Rare	Lost	Lost			0	50
honeylocust	Gleditsia triacanthos	NSH	Low	6.4	3.8	5.5	Lg. inc.	Lg. inc.	High	Rare	Good	Good			2	51
pignut hickory	Carya glabra	WDL	Medium	0.5	3.6	1.9	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	52
black maple	Acer nigrum	NSH	Low	2.6	3.5	4.4	Lg. dec.	Lg. dec.	High	Rare	Poor	Poor			0	53
American hornbeam; musclev	Carpinus caroliniana	WSL	Low	1.7	2.3	1.4	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	54
black spruce	Picea mariana	NSH	High	0.5	2.2	2.4	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	55
mockernut hickory	Carya alba	WDL	Medium	0.2	2.1	8.7	No change	No change	High	Rare	Fair	Fair	Infill +	Infill +	2	56
balsam poplar	Populus balsamifera	NSH	Medium	0.8	2.1	1.3	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	57
sassafras	Sassafras albidum	WSL	Low	0.2	1.8	2.2	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	58
serviceberry	Amelanchier spp.	NSL	Low	2.3	1.5	1.1	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	59
peachleaf willow	Salix amygdaloides	NSLX	FIA	2.2	1.4	2.3	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	60
blackgum	Nyssa sylvatica	WDL	Medium	0.2	0.8	3.1	Lg. dec.	No change	High	Rare	Poor	Fair		Infill +	2	61
flowering dogwood	Cornus florida	WDL	Medium	0.2	0.7	3.0	Lg. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	62
pin oak	Quercus palustris	NSH	Low	1.4	0.3	2.0	Lg. inc.	Lg. inc.	Low	Rare	Fair	Fair	Infill +	Infill +	2	63
sycamore	Platanus occidentalis	NSL	Low	0.6	0.2	2.2	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	64
wild plum	Prunus americana	NSLX	FIA	0.2	0.2	0.8	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	65
northern catalpa	Catalpa speciosa	NSHX	FIA	0.6	0.1	1.3	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	66
rock elm	Ulmus thomasii	NSLX	FIA	0	0.1	0.1	Unknown	Unknown	Low	Rare	FIA Only	FIA Only			0	67
Norway maple	Acer platanoides	NSL	FIA	0.6	0.0	0.4	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	68
striped maple	Acer pensylvanicum	NSL	Medium	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	69
Ohio buckeye	Aesculus glabra	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +		3	70
cittamwood/gum bumelia	Sideroxylon lanuginosum ssp.	NSL	Low	0	0	0	Unknown	New Habitat	High	Absent	Unknown	New Habitat			3	71
pecan	Carya illinoensis	NSH	Low	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat			3	72
black hickory	Carya texana	NDL	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	73
sugarberry	Celtis laevigata	NDH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	74
eastern redbud	Cercis canadensis	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	75
common persimmon	Diospyros virginiana	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat		Migrate +	3	76
sweetgum	Liquidambar styraciflua	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	77
cucumbertree	Magnolia acuminata	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	78
mountain or Fraser magnolia	Magnolia fraseri	NSL	Low	0	0	0	Unknown	Unknown	Low	Absent	Unknown	Unknown			0	79
shingle oak	Quercus imbricaria	NDH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	80
blackjack oak	Quercus marilandica	NSL	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +	Migrate ++	3	81
chinkapin oak	Quercus muehlenbergii	NSL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	82
Shumard oak	Quercus shumardii	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat		Migrate +	3	83
post oak	Quercus stellata	WDH	High	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate ++	Migrate ++	3	84
bluejack oak	Quercus incana	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	85
American mountain-ash	Sorbus americana	NSL	Low	0	0	0	Unknown	Unknown	Low	Absent	Unknown	Unknown			0	86
winged elm	Ulmus alata	WDL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate ++	3	87

