

Section 222I

EcoMap 2007 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 26,629 10,282 438

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	27	28	Increase	21	23	Very Good	3	3
Hickory	5			Medium	34	54	No Change	14	13	Good	20	24
Maple	7	Abundant	4	Low	37	18	Decrease	31	30	Fair	11	6
Oak	11	Common	22	FIA	5		New	24	27	Poor	11	11
Pine	7	Rare	45				Unknown	13	10	Very Poor	19	17
Other	38	Absent	30							FIA Only	2	2
	71		101		103	100		103	103	Unknown	8	5
											74	68

Potential Changes in Climate Variables

Temperature (°F)

Scenario	2009	2039	2069	2099		
Annual	CCSM45	47.7	49.7	52.3	52.3	
Average	CCSM85	47.7	50.2	52.9	56.1	
	GFDL45	47.7	52.3	54.0	55.3	
	GFDL85	47.7	51.3	55.2	60.0	
	HAD45	47.7	51.0	54.4	56.2	
	HAD85	47.7	51.1	55.4	60.9	
Growing Season	CCSM45	64.7	66.7	68.9	69.2	
	CCSM85	64.7	67.0	69.5	73.5	
May—Sep	GFDL45	64.7	70.1	72.2	73.7	
	GFDL85	64.7	69.1	73.6	78.7	
	HAD45	64.7	68.2	71.0	73.5	
	HAD85	64.7	67.8	72.7	78.7	
Coldest Month	CCSM45	21.6	23.7	26.0	26.1	
Average	CCSM85	21.6	24.9	26.2	28.4	
	GFDL45	21.6	24.4	26.3	27.0	
	GFDL85	21.6	25.3	27.0	29.5	
	HAD45	21.6	23.5	26.9	27.0	
	HAD85	21.6	25.0	27.6	31.2	
Warmest Month	CCSM45	70.8	73.0	74.4	74.6	
Average	CCSM85	70.8	73.6	75.3	77.5	
	GFDL45	70.8	73.8	76.2	77.2	
	GFDL85	70.8	75.1	77.7	80.6	
	HAD45	70.8	74.7	76.3	78.1	
	HAD85	70.8	74.8	78.0	82.4	

Precipitation (in)

Scenario	2009	2039	2069	2099		
Annual	CCSM45	38.1	38.1	36.9	39.8	
Total	CCSM85	38.1	39.2	39.1	39.4	
	GFDL45	38.1	41.8	43.5	42.9	
	GFDL85	38.1	39.6	42.7	44.2	
	HAD45	38.1	38.9	40.3	40.0	
	HAD85	38.1	40.1	38.6	42.3	
Growing Season	CCSM45	17.7	17.6	16.3	17.7	
	CCSM85	17.7	17.3	17.0	16.1	
May—Sep	GFDL45	17.7	18.6	18.2	17.9	
	GFDL85	17.7	17.6	17.6	17.1	
	HAD45	17.7	17.6	16.3	17.1	
	HAD85	17.7	17.5	15.4	16.3	

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
red maple	Acer rubrum	WDH	High	59.2	954.5	13.7	Sm. dec.	Sm. dec.	High	Abundant	Good	Good			1	1
sugar maple	Acer saccharum	WDH	High	56.7	854.3	13.5	No change	Sm. dec.	High	Abundant	Very Good	Good			1	2
white ash	Fraxinus americana	WDL	Medium	66.8	743.3	11.0	Sm. dec.	Sm. dec.	Low	Abundant	Fair	Fair			0	3
green ash	Fraxinus pennsylvanica	WSH	Low	44.4	532.2	17.3	No change	No change	Medium	Abundant	Good	Good			1	4
black cherry	Prunus serotina	WDL	Medium	50.4	347.6	5.8	Sm. inc.	No change	Low	Common	Fair	Poor			1	5
quaking aspen	Populus tremuloides	WDH	High	32.2	286.0	9.0	Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor			0	6
eastern white pine	Pinus strobus	WDH	High	16.4	245.4	9.8	Sm. dec.	Lg. dec.	Low	Common	Poor	Very Poor			0	7
silver maple	Acer saccharinum	NSH	Low	22.7	225.3	13.9	No change	No change	High	Common	Good	Good			1	8
American elm	Ulmus americana	WDH	Medium	50.6	218.7	4.5	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	9
eastern hemlock	Tsuga canadensis	NSH	High	20.8	217.7	6.5	Lg. dec.	Lg. dec.	Low	Common	Very Poor	Very Poor			0	10
American basswood	Tilia americana	WSL	Medium	42.7	196.9	5.9	No change	Sm. dec.	Medium	Common	Fair	Poor			1	11
American beech	Fagus grandifolia	WDH	High	34.6	171.2	4.3	No change	No change	Medium	Common	Fair	Fair			1	12
northern red oak	Quercus rubra	WDH	Medium	26.2	166.9	6.2	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	13
bitternut hickory	Carya cordiformis	WSL	Low	32.1	158.6	6.1	Sm. dec.	No change	High	Common	Fair	Good			1	14
eastern cottonwood	Populus deltoides	NSH	Low	14.6	143.6	7.8	No change	No change	Medium	Common	Fair	Fair			1	15
boxelder	Acer negundo	WSH	Low	20	118.2	9.7	No change	Sm. inc.	High	Common	Good	Very Good			1	16
Scots pine	Pinus sylvestris	NSH	FIA	8.3	96.6	10.7	Unknown	Unknown	NA	Common	NNIS	NNIS			0	17
Norway spruce	Picea abies	NSH	FIA	11.7	94.8	8.0	Unknown	Unknown	NA	Common	NNIS	NNIS			0	18
shagbark hickory	Carya ovata	WSL	Medium	28.5	82.5	4.6	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	19
black willow	Salix nigra	NSH	Low	15.6	81.2	8.0	Lg. dec.	No change	Low	Common	Very Poor	Poor			0	20
black walnut	Juglans nigra	WDH	Low	19.6	78.5	5.2	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	21
eastern hophornbeam; ironw	Ostrya virginiana	WDL	Low	28.4	75.1	2.7	No change	No change	High	Common	Good	Good			1	22
black locust	Robinia pseudoacacia	NDH	Low	10	69.5	8.1	No change	No change	Medium	Common	Fair	Fair			1	23
bigtooth aspen	Populus grandidentata	NSL	Medium	8	58.4	4.9	Sm. dec.	Lg. dec.	Medium	Common	Poor	Poor	Infill +	Infill +	0	24
yellow birch	Betula alleghaniensis	NDL	High	13.8	56.7	2.7	Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor			0	25
white spruce	Picea glauca	NSL	Medium	4.9	51.4	19.8	Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor			0	26
pignut hickory	Carya glabra	WDL	Medium	13.1	38.8	5.8	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	1	27
red pine	Pinus resinosa	NSH	Medium	4.1	35.1	8.6	Lg. dec.	Lg. dec.	Low	Rare	Very Poor	Very Poor			2	28
black oak	Quercus velutina	WDH	High	5	33.8	4.8	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	2	29
eastern redcedar	Juniperus virginiana	WDH	Medium	4.5	33.6	11.7	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	2	30
yellow-poplar	Liriodendron tulipifera	WDH	High	10.8	32.5	2.6	Lg. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	Infill ++	2	31
pin oak	Quercus palustris	NSH	Low	6.3	30.9	4.5	No change	No change	Low	Rare	Very Poor	Very Poor			2	32
white oak	Quercus alba	WDH	Medium	9.1	30.6	3.0	Lg. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	Infill ++	2	33
American hornbeam; muscle	Carpinus caroliniana	WSL	Low	18.1	30.1	1.5	Lg. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	34
northern white-cedar	Thuja occidentalis	WSH	High	2.2	27.4	8.5	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	35
swamp white oak	Quercus bicolor	NSL	Low	13.4	26.5	4.4	Sm. inc.	Sm. inc.	Medium	Rare	Fair	Fair	Infill +	Infill +	1	36
black ash	Fraxinus nigra	WSH	Medium	10.2	25.5	3.0	Lg. dec.	Lg. dec.	Low	Rare	Very Poor	Very Poor			0	37
blackgum	Nyssa sylvatica	WDL	Medium	4.7	19.1	3.4	No change	Sm. inc.	High	Rare	Fair	Good	Infill +	Infill ++	2	38
pin cherry	Prunus pensylvanica	NSL	Low	4.1	17.8	3.4	Lg. dec.	Very Lg. dec.	Medium	Rare	Very Poor	Lost			0	39
bur oak	Quercus macrocarpa	NDH	Medium	8.3	16.4	4.0	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor		Infill +	2	40
serviceberry	Amelanchier spp.	NSL	Low	8.7	15.5	1.0	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	41
butternut	Juglans cinerea	NSLX	FIA	5.2	15.1	3.6	Unknown	Unknown	Low	Rare	FIA Only	FIA Only			0	42
chokecherry	Prunus virginiana	NSLX	FIA	12.4	13.8	2.5	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	43
sassafras	Sassafras albidum	WSL	Low	2.5	12.4	1.5	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	44
slippery elm	Ulmus rubra	WSL	Low	3.6	8.5	2.0	Sm. inc.	Lg. inc.	Medium	Rare	Fair	Good	Infill +	Infill ++	2	45
gray birch	Betula populifolia	NSL	Low	1.5	8.4	2.7	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	46
balsam fir	Abies balsamea	NDH	High	0.2	7.7	8.4	Very Lg. dec.	Very Lg. dec.	Low	Rare	Lost	Lost			0	47



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sycamore	Platanus occidentalis	NSL	Low	0.7	7.7	5.4	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	48
striped maple	Acer pensylvanicum	NSL	Medium	2.7	7.5	1.2	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	49
tamarack (native)	Larix laricina	NSH	High	0.8	7.3	5.3	Sm. dec.	Lg. dec.	Low	Rare	Very Poor	Very Poor			0	50
chestnut oak	Quercus prinus	NDH	High	1.3	7.0	1.7	Lg. inc.	Lg. inc.	High	Rare	Good	Good			2	51
pitch pine	Pinus rigida	NSH	High	2.1	6.0	5.5	Sm. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	52
black spruce	Picea mariana	NSH	High	0.4	5.8	15.3	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	53
sweet birch	Betula lenta	NDH	High	3.1	5.7	0.9	Sm. inc.	Sm. inc.	Low	Rare	Poor	Poor	Infill +	Infill +	2	54
paper birch	Betula papyrifera	WDH	High	1	5.2	1.2	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			2	55
cucumber tree	Magnolia acuminata	NSL	Low	3.1	3.8	1.0	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	56
northern pin oak	Quercus ellipsoidalalis	NSH	Medium	0.4	3.3	8.9	No change	No change	High	Rare	Fair	Fair	Infill +	Infill +	2	57
jack pine	Pinus banksiana	NSH	Medium	0.2	3.3	4.3	Very Lg. dec.	Very Lg. dec.	High	Rare	Lost	Lost			0	58
red spruce	Picea rubens	NDH	High	0.9	3.0	2.4	Lg. dec.	Lg. dec.	Low	Rare	Very Poor	Very Poor			0	59
Norway maple	Acer platanoides	NSL	FIA	2.3	2.5	2.1	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	60
shellbark hickory	Carya laciniosa	NSL	Low	0.1	1.3	1.1	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	61
chinkapin oak	Quercus muehlenbergii	NSL	Medium	0.1	1.1	0.5	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	62
flowering dogwood	Cornus florida	WDL	Medium	1.5	1.1	0.5	No change	No change	Medium	Rare	Poor	Poor		Infill +	2	63
black maple	Acer nigrum	NSH	Low	0.1	1.0	0.4	Lg. dec.	Very Lg. dec.	High	Rare	Poor	Lost			0	64
swamp chestnut oak	Quercus michauxii	NSL	Low	0.1	0.6	0.3	Sm. dec.	No change	Medium	Rare	Very Poor	Poor		Infill +	2	65
Table Mountain pine	Pinus pungens	NSL	Low	0.2	0.4	0.5	Lg. dec.	Very Lg. dec.	High	Rare	Poor	Lost			0	66
scarlet oak	Quercus coccinea	WDL	Medium	0.8	0.2	0.4	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	67
Virginia pine	Pinus virginiana	NDH	High	0.2	0.2	0.2	No change	Lg. inc.	Medium	Rare	Poor	Good	Infill +		2	68
mockernut hickory	Carya alba	WDL	Medium	0.7	0.1	0.7	Lg. inc.	Lg. inc.	High	Rare	Good	Good			2	69
hackberry	Celtis occidentalis	WDH	Medium	0.5	0.1	0.4	Lg. inc.	Lg. inc.	High	Rare	Good	Good			2	70
sweetgum	Liquidambar styraciflua	WDH	High	0.5	0.1	0.2	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	71
shortleaf pine	Pinus echinata	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +	3	72
loblolly pine	Pinus taeda	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate ++	3	73
florida maple	Acer barbatum	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			0	74
Ohio buckeye	Aesculus glabra	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	75
cittamwood/gum bumelia	Sideroxylon lanuginosum ssp.	NSL	Low	0	0	0	Unknown	New Habitat	High	Absent	Unknown	New Habitat			0	76
pecan	Carya illinoensis	NSH	Low	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat			2	77
black hickory	Carya texana	NDL	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			0	78
sugarberry	Celtis laevigata	NDH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			2	79
eastern redbud	Cercis canadensis	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	80
common persimmon	Diospyros virginiana	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	81
honeylocust	Gleditsia triacanthos	NSH	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	82
American holly	Ilex opaca	NSL	Medium	0	0	0	Unknown	Unknown	Medium	Modeled	Unknown	Unknown			0	83
Osage-orange	Maclura pomifera	NDH	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Likely +	Likely +	3	84
bigleaf magnolia	Magnolia macrophylla	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	85
mountain or Fraser magnolia	Magnolia fraseri	NSL	Low	0	0	0	Unknown	Unknown	Low	Absent	Unknown	Unknown			0	86
red mulberry	Morus rubra	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +	3	87
sourwood	Oxydendrum arboreum	NDL	High	0	0	0	Unknown	New Habitat	High	Absent	Unknown	New Habitat		Migrate +	3	88
balsam poplar	Populus balsamifera	NSH	Medium	0	0	0	Unknown	Unknown	Medium	Modeled	Unknown	Unknown			0	89
southern red oak	Quercus falcata	WDL	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat		Migrate +	3	90
cherrybark oak; swamp red o.	Quercus pagoda	NSL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	91
shingle oak	Quercus imbricaria	NDH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	92
overcup oak	Quercus lyrata	NSL	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat			3	93
blackjack oak	Quercus marilandica	NSL	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			3	94



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water oak	Quercus nigra	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	95
willow oak	Quercus phellos	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +	3	96
Shumard oak	Quercus shumardii	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat		Migrate +	3	97
post oak	Quercus stellata	WDH	High	0	0	0	New Habitat	New Habitat	High	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	New Habitat	Medium	Absent	Unknown	New Habitat			0	100
American mountain-ash	Sorbus americana	NSL	Low	0	0	0	Unknown	Unknown	Low	Absent	Unknown	Unknown			0	101
winged elm	Ulmus alata	WDL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate ++	3	102
cedar elm	Ulmus crassifolia	NDH	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat			0	103