

# Section 221B

## 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	12,864	4,966.7	292

### 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			
		Abundant	Common	Reliability	Adaptability	Scenario	Scenario	Scenario	Scenario	SHIFT	SHIFT		
						RCP45	RCP85	RCP45	RCP85	RCP45	RCP85		
Ash	3			High	24	19	20	Very Good	11	11	Likely	0	0
Hickory	5			Medium	27	15	14	Good	10	11	Infill	11	11
Maple	7	Abundant	8	Low	37	25	25	Fair	11	11	Migrate	7	14
Oak	11	Common	25	FIA	11	24	26	Poor	14	14		18	25
Pine	5	Rare	37			16	14	Very Poor	13	9			
Other	39	Absent	29			99	99	FIA Only	6	6			
	<b>70</b>		<b>99</b>					Unknown	5	3			
									<b>70</b>	<b>65</b>			

### Potential Changes in Climate Variables

#### Temperature (°F)

Scenario	2009	2039	2069	2099	
Annual	48.1	50.0	52.3	52.6	
Average	48.1	50.5	53.1	56.3	
GFDL45	48.1	51.1	54.3	55.6	
GFDL85	48.1	51.6	55.6	60.1	
HAD45	48.1	51.0	54.3	56.0	
HAD85	48.1	51.1	55.3	60.6	
Growing Season	65.3	67.4	69.2	69.7	
May—Sep	65.3	68.4	72.2	73.6	
GFDL45	65.3	68.2	73.7	78.5	
GFDL85	65.3	69.2	73.7	78.5	
HAD45	65.3	68.3	71.1	73.4	
HAD85	65.3	67.8	72.5	78.3	
Coldest Month	21.5	23.3	25.3	25.7	
Average	21.5	24.2	25.4	27.7	
GFDL45	21.5	24.9	26.7	27.6	
GFDL85	21.5	25.3	27.1	29.5	
HAD45	21.5	23.8	26.7	26.9	
HAD85	21.5	24.9	27.3	30.4	
Warmest Month	71.3	73.9	75.0	75.1	
Average	71.3	74.2	75.8	77.9	
GFDL45	71.3	74.2	76.3	77.6	
GFDL85	71.3	74.2	76.3	81.0	
HAD45	71.3	74.7	76.2	77.5	
HAD85	71.3	74.4	77.0	81.1	

#### Precipitation (in)

Scenario	2009	2039	2069	2099	
Annual	44.0	44.4	43.5	47.9	
Total	44.0	44.7	47.1	49.3	
GFDL45	44.0	48.6	50.9	49.5	
GFDL85	44.0	46.5	49.8	52.5	
HAD45	44.0	45.9	47.2	46.9	
HAD85	44.0	47.4	47.2	49.6	
Growing Season	20.3	21.7	20.7	22.3	
May—Sep	20.3	21.0	20.6	21.3	
GFDL45	20.3	20.5	20.8	21.0	
GFDL85	20.3	20.5	20.8	21.0	
HAD45	20.3	21.6	20.2	20.8	
HAD85	20.3	20.7	20.3	21.1	

**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
red maple	Acer rubrum	WDH	High	80	1466.4	9.9	No change	Sm. dec.	High	Abundant	Very Good	Good			1	1
sugar maple	Acer saccharum	WDH	High	68.6	1199.0	8.8	No change	Sm. dec.	High	Abundant	Very Good	Good			1	2
eastern white pine	Pinus strobus	WDH	High	50.8	1025.1	11.7	Lg. dec.	Lg. dec.	Low	Abundant	Poor	Poor			0	3
northern red oak	Quercus rubra	WDH	Medium	61.2	975.8	7.4	No change	No change	High	Abundant	Very Good	Very Good			1	4
white ash	Fraxinus americana	WDL	Medium	59.3	852.8	7.2	No change	No change	Low	Abundant	Fair	Fair			0	5
eastern hemlock	Tsuga canadensis	NSH	High	37.7	618.0	8.2	Lg. dec.	Lg. dec.	Low	Abundant	Poor	Poor			0	6
chestnut oak	Quercus prinus	NDH	High	34.6	605.2	6.6	Sm. inc.	Sm. inc.	High	Abundant	Very Good	Very Good			1	7
black cherry	Prunus serotina	WDL	Medium	53.7	530.0	6.4	Sm. inc.	No change	Low	Abundant	Good	Fair			1	8
American elm	Ulmus americana	WDH	Medium	49.5	442.4	6.1	No change	No change	Medium	Common	Fair	Fair			1	9
sweet birch	Betula lenta	NDH	High	48.3	430.3	4.5	No change	Sm. dec.	Low	Common	Poor	Poor			0	10
black oak	Quercus velutina	WDH	High	36	302.6	5.8	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	11
eastern redcedar	Juniperus virginiana	WDH	Medium	24.2	283.4	7.7	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	12
white oak	Quercus alba	WDH	Medium	41.3	278.5	4.0	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	13
American beech	Fagus grandifolia	WDH	High	34	244.0	3.8	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	14
shagbark hickory	Carya ovata	WSL	Medium	37.6	231.6	4.5	No change	No change	Medium	Common	Fair	Fair			1	15
eastern hophornbeam; ironw	Ostrya virginiana	WSL	Low	40.3	211.8	2.9	Sm. dec.	No change	High	Common	Fair	Good			1	16
pignut hickory	Carya glabra	WDL	Medium	31.8	182.4	3.0	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	17
swamp white oak	Quercus bicolor	NSL	Low	8.4	175.9	14.4	Sm. dec.	Sm. dec.	Medium	Common	Poor	Poor	Infill +	Infill +	0	18
quaking aspen	Populus tremuloides	WDH	High	21.5	162.7	5.5	Sm. dec.	Sm. dec.	Medium	Common	Poor	Poor			0	19
green ash	Fraxinus pennsylvanica	WSH	Low	16.1	141.1	6.4	Sm. inc.	Lg. inc.	Medium	Common	Good	Very Good			1	20
bitternut hickory	Carya cordiformis	WSL	Low	17.8	122.7	4.1	No change	Sm. inc.	High	Common	Good	Very Good			1	21
American basswood	Tilia americana	WSL	Medium	24.6	121.0	2.4	Sm. inc.	Sm. inc.	Medium	Common	Good	Good			1	22
black locust	Robinia pseudoacacia	NDH	Low	11.2	120.7	8.5	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	23
eastern cottonwood	Populus deltoides	NSH	Low	4.6	115.5	19.5	No change	No change	Medium	Common	Fair	Fair	Infill +	Infill +	1	24
yellow birch	Betula alleghaniensis	NDL	High	17.9	99.0	2.4	No change	No change	Medium	Common	Fair	Fair			1	25
pitch pine	Pinus rigida	NSH	High	7.6	94.4	8.5	Sm. dec.	Sm. dec.	Medium	Common	Poor	Poor			0	26
black walnut	Juglans nigra	WDH	Low	7.6	93.7	7.0	No change	No change	Medium	Common	Fair	Fair	Infill +	Infill +	1	27
pin oak	Quercus palustris	NSH	Low	9.3	91.7	11.4	No change	No change	Low	Common	Poor	Poor	Infill +	Infill +	0	28
yellow-poplar	Liriodendron tulipifera	WDH	High	9.2	90.9	5.0	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good	Infill ++	Infill ++	1	29
paper birch	Betula papyrifera	WDH	High	15.5	89.4	2.9	Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor			0	30
scarlet oak	Quercus coccinea	WDL	Medium	11.4	77.4	2.8	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good	Infill ++	Infill ++	1	31
bigtooth aspen	Populus grandidentata	NSL	Medium	14.3	70.1	2.0	Sm. dec.	Lg. dec.	Medium	Common	Poor	Poor			0	32
Norway maple	Acer platanoides	NSL	FIA	5.7	65.1	8.5	Unknown	Unknown	NA	Common	NNIS	NNIS			0	33
sassafras	Sassafras albidum	WSL	Low	8.3	48.4	2.9	Sm. inc.	Sm. inc.	Medium	Rare	Fair	Fair			1	34
serviceberry	Amelanchier spp.	NSL	Low	21.6	46.2	1.3	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	35
hackberry	Celtis occidentalis	WDH	Medium	1.9	40.4	3.7	No change	No change	High	Rare	Fair	Fair	Infill +	Infill +	2	36
boxelder	Acer negundo	WSH	Low	5	39.9	7.0	No change	No change	High	Rare	Fair	Fair	Infill +	Infill +	1	37
blackgum	Nyssa sylvatica	WDL	Medium	10.3	38.3	2.7	Lg. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	Infill ++	1	38
ailanthus	Ailanthus altissima	NSL	FIA	4.5	37.8	5.7	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	39
American hornbeam; musclev	Carpinus caroliniana	WSL	Low	20.3	37.6	1.3	Sm. dec.	Sm. inc.	Medium	Rare	Very Poor	Fair			1	40
black ash	Fraxinus nigra	WSH	Medium	7.8	34.8	2.3	Lg. dec.	Lg. dec.	Low	Rare	Very Poor	Very Poor			0	41
Scots pine	Pinus sylvestris	NSH	FIA	1.4	34.9	9.9	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	42
gray birch	Betula populifolia	NSL	Low	7.8	32.8	2.3	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	43
red spruce	Picea rubens	NDH	High	1.8	25.0	4.4	Lg. dec.	Lg. dec.	Low	Rare	Very Poor	Very Poor			0	44
bur oak	Quercus macrocarpa	NDH	Medium	1.6	22.5	14.4	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor			0	45
red pine	Pinus resinosa	NSH	Medium	2.3	18.5	7.3	Lg. dec.	Very Lg. dec.	Low	Rare	Very Poor	Lost			0	46
striped maple	Acer pensylvanicum	NSL	Medium	8.6	14.7	0.6	Sm. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	47



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mockernut hickory	Carya alba	WDL	Medium	7.6	14.7	0.9	Lg. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	Infill ++	1	48
flowering dogwood	Cornus florida	WDL	Medium	7.8	11.9	0.7	No change	No change	Medium	Rare	Poor	Poor			1	49
tamarack (native)	Larix laricina	NSH	High	1.6	11.8	4.2	Lg. dec.	Lg. dec.	Low	Rare	Very Poor	Very Poor			0	50
black willow	Salix nigra	NSH	Low	1.7	11.3	4.6	Sm. dec.	No change	Low	Rare	Very Poor	Very Poor			2	51
butternut	Juglans cinerea	NSLX	FIA	2.2	9.7	0.8	Unknown	Unknown	Low	Rare	FIA Only	FIA Only			0	52
bear oak; scrub oak	Quercus ilicifolia	NSLX	FIA	2.5	9.7	2.6	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	53
Norway spruce	Picea abies	NSH	FIA	1.1	9.4	5.0	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	54
sycamore	Platanus occidentalis	NSL	Low	1.1	9.2	2.3	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	55
river birch	Betula nigra	NSL	Low	0.4	8.3	5.6	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	56
silver maple	Acer saccharinum	NSH	Low	0.8	5.1	6.5	Lg. inc.	Lg. inc.	High	Rare	Good	Good			2	57
northern pin oak	Quercus ellipsoidalis	NSH	Medium	0.7	4.2	5.1	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor			0	58
slippery elm	Ulmus rubra	WSL	Low	2.5	3.3	0.9	Sm. inc.	Lg. inc.	Medium	Rare	Fair	Good	Infill +	Infill ++	1	59
pin cherry	Prunus pensylvanica	NSL	Low	1.3	2.8	1.8	Lg. dec.	Very Lg. dec.	Medium	Rare	Very Poor	Lost			0	60
chinkapin oak	Quercus muehlenbergii	NSL	Medium	1.5	1.8	1.1	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	61
jack pine	Pinus banksiana	NSH	Medium	0.2	1.6	0.4	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor			0	62
chokecherry	Prunus virginiana	NSLX	FIA	1.3	1.0	0.6	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	63
white mulberry	Morus alba	NSL	FIA	0.7	0.9	1.0	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	64
American chestnut	Castanea dentata	NSLX	FIA	0.7	0.5	0.6	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	65
shellbark hickory	Carya laciniosa	NSL	Low	0.2	0.5	0.2	Lg. dec.	Very Lg. dec.	Medium	Rare	Very Poor	Lost			0	66
wild plum	Prunus americana	NSLX	FIA	0.8	0.5	0.7	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	67
northern catalpa	Catalpa speciosa	NSHX	FIA	0.6	0.5	0.5	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	68
mountain maple	Acer spicatum	NSL	Low	0.6	0.5	0.5	Lg. dec.	Lg. dec.	High	Rare	Poor	Poor			0	69
balsam fir	Abies balsamea	NDH	High	0.8	0.3	0.4	Lg. dec.	Lg. dec.	Low	Rare	Very Poor	Very Poor			0	70
shortleaf pine	Pinus echinata	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate ++	3	71
Table Mountain pine	Pinus pungens	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			3	72
loblolly pine	Pinus taeda	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate ++	3	73
Virginia pine	Pinus virginiana	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	74
florida maple	Acer barbatum	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			3	75
yellow buckeye	Aesculus flava	NSL	Low	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat			3	76
pawpaw	Asimina triloba	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	77
cittamwood/gum bumelia	Sideroxylon lanuginosum ssp.	NSL	Low	0	0	0	Unknown	New Habitat	High	Absent	Unknown	New Habitat			0	78
pecan	Carya illinoensis	NSH	Low	0	0	0	Unknown	New Habitat	Low	Absent	Unknown	New Habitat			3	79
black hickory	Carya texana	NDL	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			0	80
sugarberry	Celtis laevigata	NDH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			0	81
eastern redbud	Cercis canadensis	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	82
common persimmon	Diospyros virginiana	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat		Migrate +	3	83
honeylocust	Gleditsia triacanthos	NSH	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			3	84
sweetgum	Liquidambar styraciflua	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate ++	3	85
cucumbertree	Magnolia acuminata	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +	3	86
bigleaf magnolia	Magnolia macrophylla	NSL	Low	0	0	0	New Habitat	Unknown	Medium	Absent	New Habitat	Unknown			0	87
mountain or Fraser magnolia	Magnolia fraseri	NSL	Low	0	0	0	Unknown	Unknown	Low	Absent	Unknown	Unknown			0	88
sourwood	Oxydendrum arboreum	NDL	High	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	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		Migrate +	3	91
blackjack oak	Quercus marilandica	NSL	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat		Migrate ++	3	92
swamp chestnut oak	Quercus michauxii	NSL	Low	0	0	0	Unknown	New Habitat	Medium	Absent	Unknown	New Habitat			3	93
water oak	Quercus nigra	WDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	94



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willow oak	Quercus phellos	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +	3	95
Shumard oak	Quercus shumardii	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat			0	96
post oak	Quercus stellata	WDH	High	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +	Migrate ++	3	97
American mountain-ash	Sorbus americana	NSL	Low	0	0	0	Unknown	Unknown	Low	Absent	Unknown	Unknown			0	98
winged elm	Ulmus alata	WDL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	99