

Section 231D

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

sq. km sq. mi FIA Plots
Area of Region 21,160 8,170.0 640

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	2			High	23	26	Increase	32	37	Very Good	16	16	Likely	0	1
Hickory	7			Medium	31	55	No Change	15	13	Good	13	18	Infill	15	16
Maple	5	Abundant	4	Low	41	16	Decrease	28	25	Fair	14	14	Migrate	4	9
Oak	16	Common	25	FIA	6		New	12	14	Poor	10	6		19	26
Pine	6	Rare	52				Unknown	14	12	Very Poor	21	20			
Other	45	Absent	19							FIA Only	3	3			
	81		100		101	97		101	101	Unknown	8	6			
											85	83			

Potential Changes in Climate Variables

Temperature (°F)

Scenario	2009	2039	2069	2099
Annual	60.9	62.7	64.8	64.9
Average	60.9	63.0	65.5	68.2
GFDL45	60.9	63.6	65.6	66.4
GFDL85	60.9	63.5	66.7	70.2
HAD45	60.9	63.1	66.1	67.5
HAD85	60.9	63.5	67.8	71.6
Growing Season	74.7	76.4	78.2	78.7
May—Sep	74.7	77.6	79.7	81.1
GFDL45	74.7	77.4	81.2	85.1
GFDL85	74.7	77.4	81.2	85.1
HAD45	74.7	78.0	80.6	82.1
HAD85	74.7	78.0	84.2	87.6
Coldest Month	40.2	42.5	43.4	43.4
Average	40.2	42.7	43.9	45.1
GFDL45	40.2	43.6	43.7	44.1
GFDL85	40.2	42.1	43.2	43.6
HAD45	40.2	40.0	42.0	42.4
HAD85	40.2	41.3	42.6	44.2
Warmest Month	79.4	81.2	82.1	82.1
Average	79.4	81.3	82.8	84.7
GFDL45	79.4	82.0	83.1	84.0
GFDL85	79.4	82.0	84.0	86.0
HAD45	79.4	83.7	85.6	86.2
HAD85	79.4	84.1	88.2	89.7

Precipitation (in)

Scenario	2009	2039	2069	2099
Annual	52.9	55.0	58.7	58.2
Total	52.9	55.9	58.0	63.9
GFDL45	52.9	59.6	62.5	66.3
GFDL85	52.9	59.4	62.3	64.5
HAD45	52.9	51.4	57.2	57.9
HAD85	52.9	56.7	50.7	55.3
Growing Season	20.7	21.5	22.5	22.9
May—Sep	20.7	21.3	21.3	23.5
GFDL45	20.7	25.4	27.0	27.5
GFDL85	20.7	25.2	27.3	28.4
HAD45	20.7	20.0	21.8	20.9
HAD85	20.7	22.5	16.5	18.4

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
loblolly pine	Pinus taeda	WDH	High	87.3	3435.0	28.0	No change	No change	Medium	Abundant	Good	Good			1	1
sweetgum	Liquidambar styraciflua	WDH	High	81.4	808.8	7.1	Sm. inc.	Sm. inc.	Medium	Abundant	Very Good	Very Good			1	2
chestnut oak	Quercus prinus	NDH	High	53.5	716.1	8.6	Sm. dec.	Sm. dec.	High	Abundant	Good	Good			1	3
Virginia pine	Pinus virginiana	NDH	High	56.7	559.0	5.8	Sm. dec.	Sm. dec.	Medium	Abundant	Fair	Fair			0	4
white oak	Quercus alba	WDH	Medium	71	470.6	4.3	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good			1	5
yellow-poplar	Liriodendron tulipifera	WDH	High	57.1	456.2	5.0	Sm. dec.	Sm. dec.	High	Common	Fair	Fair			1	6
southern red oak	Quercus falcata	WDL	Medium	59.6	380.3	4.2	Sm. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	7
red maple	Acer rubrum	WDH	High	67.1	372.1	3.5	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good			1	8
shortleaf pine	Pinus echinata	WDH	High	65.8	366.3	4.0	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	9
pignut hickory	Carya glabra	WDL	Medium	72.5	359.3	3.3	Sm. dec.	Sm. dec.	Medium	Common	Poor	Poor			0	10
mockernut hickory	Carya alba	WDL	Medium	64	306.6	3.6	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good			1	11
post oak	Quercus stellata	WDH	High	61.3	298.8	3.6	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	12
water oak	Quercus nigra	WDH	High	53.5	284.2	4.4	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	13
black cherry	Prunus serotina	WDL	Medium	72.1	235.4	2.4	Sm. inc.	Sm. inc.	Low	Common	Fair	Fair			1	14
blackgum	Nyssa sylvatica	WDL	Medium	70	216.8	2.0	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	15
sourwood	Oxydendrum arboreum	NDL	High	55.4	208.9	2.3	Sm. dec.	Sm. dec.	High	Common	Fair	Fair			1	16
longleaf pine	Pinus palustris	NSH	Medium	22.6	195.6	6.0	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	17
black oak	Quercus velutina	WDH	High	45	185.5	2.5	No change	No change	Medium	Common	Fair	Fair			1	18
scarlet oak	Quercus coccinea	WDL	Medium	37.4	165.4	2.8	Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor			0	19
flowering dogwood	Cornus florida	WDL	Medium	63.3	150.3	1.6	No change	No change	Medium	Common	Fair	Fair			1	20
winged elm	Ulmus alata	WDL	Medium	47.5	144.6	2.2	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	21
northern red oak	Quercus rubra	WDH	Medium	39.2	127.0	2.2	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good			1	22
green ash	Fraxinus pennsylvanica	WSH	Low	28.6	124.8	3.2	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	23
blackjack oak	Quercus marilandica	NSL	Medium	27.4	89.5	2.4	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good			1	24
eastern redcedar	Juniperus virginiana	WDH	Medium	23.6	87.1	2.7	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	25
American elm	Ulmus americana	WDH	Medium	18.1	66.9	2.5	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	26
sugarberry	Celtis laevigata	NDH	Medium	9.2	64.5	5.8	Sm. inc.	Sm. inc.	Medium	Common	Good	Good	Infill ++	Infill ++	1	27
boxelder	Acer negundo	WSH	Low	7.6	60.6	5.8	Sm. dec.	No change	High	Common	Fair	Good	Infill +	Infill ++	1	28
red mulberry	Morus rubra	NSL	Low	8.3	57.8	4.4	Sm. dec.	No change	Medium	Common	Poor	Fair			1	29
shagbark hickory	Carya ovata	WSL	Medium	17.3	48.5	2.0	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	30
black walnut	Juglans nigra	WDH	Low	4.6	37.7	5.7	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	31
sycamore	Platanus occidentalis	NSL	Low	10.9	36.7	3.5	Sm. inc.	Lg. inc.	Medium	Rare	Fair	Good	Infill +	Infill ++	1	32
sassafras	Sassafras albidum	WSL	Low	20.1	35.4	1.1	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			1	33
common persimmon	Diospyros virginiana	NSL	Low	27.1	35.1	0.9	Lg. inc.	Lg. inc.	High	Rare	Good	Good			1	34
hackberry	Celtis occidentalis	WDH	Medium	7	30.6	4.4	No change	No change	High	Rare	Fair	Fair	Infill +	Infill +	1	35
cherrybark oak; swamp red o	Quercus pagoda	NSL	Medium	8.8	29.8	2.0	No change	Sm. inc.	Medium	Rare	Poor	Fair	Infill +	Infill +	1	36
American hornbeam; muscle	Carpinus caroliniana	WSL	Low	11.8	27.3	1.6	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			1	37
white ash	Fraxinus americana	WDL	Medium	10.8	26.8	1.3	Sm. inc.	Lg. inc.	Low	Rare	Poor	Fair	Infill +	Infill +	1	38
American beech	Fagus grandifolia	WDH	High	11.8	26.0	1.3	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	1	39
willow oak	Quercus phellos	NSL	Low	9.2	24.9	2.6	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	1	40
black willow	Salix nigra	NSH	Low	7	21.9	2.9	No change	No change	Low	Rare	Very Poor	Very Poor			0	41
florida maple	Acer barbatum	NSL	Low	14.3	20.7	1.3	Sm. inc.	Lg. inc.	High	Rare	Good	Good			1	42
laurel oak	Quercus laurifolia	NDH	Medium	4.6	20.3	4.2	Sm. inc.	Lg. inc.	Medium	Rare	Fair	Good	Infill +	Infill ++	1	43
slippery elm	Ulmus rubra	WSL	Low	5.4	19.2	2.3	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	1	44
eastern cottonwood	Populus deltoides	NSH	Low	0.9	15.4	16.3	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	45
silver maple	Acer saccharinum	NSH	Low	1.2	14.6	6.3	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor			0	46
eastern hophornbeam; ironw	Ostrya virginiana	WSL	Low	8.6	13.8	0.8	Lg. inc.	Lg. inc.	High	Rare	Good	Good			1	47



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eastern redbud	Cercis canadensis	NSL	Low	10	13.7	0.8	Sm. dec.	Sm. inc.	Medium	Rare	Very Poor	Fair			1	48
eastern white pine	Pinus strobus	WDH	High	0.6	13.2	1.9	No change	No change	Low	Rare	Very Poor	Very Poor			2	49
swamp tupelo	Nyssa biflora	NDH	Medium	0.9	10.6	11.3	No change	No change	Low	Rare	Very Poor	Very Poor			2	50
black locust	Robinia pseudoacacia	NDH	Low	1.8	9.1	1.1	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	51
chinkapin oak	Quercus muehlenbergii	NSL	Medium	2.2	8.5	2.0	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			2	52
sugar maple	Acer saccharum	WDH	High	1.2	7.6	1.5	Very Lg. dec.	Very Lg. dec.	High	Rare	Lost	Lost			0	53
American basswood	Tilia americana	WSL	Medium	2.8	7.4	1.6	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	54
slash pine	Pinus elliottii	NDH	High	0.2	6.4	5.4	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	55
honeylocust	Gleditsia triacanthos	NSH	Low	2.3	6.3	2.4	No change	Lg. inc.	High	Rare	Fair	Good	Infill +	Infill ++	2	56
bitternut hickory	Carya cordiformis	WSL	Low	2.1	4.8	0.8	Sm. dec.	Sm. dec.	High	Rare	Poor	Poor			0	57
overcup oak	Quercus lyrata	NSL	Medium	0.5	4.6	2.5	Sm. dec.	Sm. dec.	Low	Rare	Very Poor	Very Poor			2	58
eastern hemlock	Tsuga canadensis	NSH	High	0.4	3.4	0.6	No change	No change	Low	Rare	Very Poor	Very Poor			2	59
paulownia	Paulownia tomentosa	NSL	FIA	0.9	3.1	3.3	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	60
cucumbertree	Magnolia acuminata	NSL	Low	0.6	3.0	0.8	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	61
wild plum	Prunus americana	NSLX	FIA	2	3.0	0.9	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	62
swamp chestnut oak	Quercus michauxii	NSL	Low	1.9	3.0	1.6	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	63
sweetbay	Magnolia virginiana	NSL	Medium	0.6	2.8	1.3	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	2	64
river birch	Betula nigra	NSL	Low	2.6	2.8	1.6	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	2	65
sand hickory	Carya pallida	NSL	FIA	1	2.5	1.3	Unknown	Unknown	NA	Rare	FIA Only	FIA Only			0	66
Shumard oak	Quercus shumardii	NSL	Low	1.5	2.4	0.9	No change	No change	High	Rare	Fair	Fair	Infill +	Infill +	2	67
pecan	Carya illinoensis	NSH	Low	0.1	1.8	1.0	Lg. inc.	Lg. inc.	Low	Rare	Fair	Fair		Infill +	2	68
sweet birch	Betula lenta	NDH	High	0.9	1.8	0.5	Sm. dec.	Sm. dec.	Low	Rare	Very Poor	Very Poor			0	69
white mulberry	Morus alba	NSL	FIA	0.5	1.1	2.4	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	70
bigleaf magnolia	Magnolia macrophylla	NSL	Low	1	1.1	0.6	No change	Sm. inc.	Medium	Rare	Poor	Fair	Infill +	Infill +	2	71
yellow buckeye	Aesculus flava	NSL	Low	0.8	1.0	0.8	Sm. dec.	Sm. dec.	Low	Rare	Very Poor	Very Poor			0	72
shellbark hickory	Carya laciniosa	NSL	Low	0.8	0.9	0.3	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	73
ailanthus	Ailanthus altissima	NSL	FIA	0.6	0.8	0.5	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	74
pin cherry	Prunus pensylvanica	NSL	Low	0.3	0.8	0.9	Sm. dec.	Sm. dec.	Medium	Rare	Very Poor	Very Poor			0	75
serviceberry	Amelanchier spp.	NSL	Low	0.9	0.7	0.3	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	76
mountain or Fraser magnolia	Magnolia fraseri	NSL	Low	0.6	0.5	0.4	Lg. dec.	Lg. dec.	Low	Rare	Very Poor	Very Poor			0	77
redbay	Persea borbonia	NSL	Low	0.5	0.4	0.8	No change	Sm. inc.	High	Rare	Fair	Good			0	78
butternut	Juglans cinerea	NSLX	FIA	0.1	0.3	0.1	Unknown	Unknown	Low	Rare	FIA Only	FIA Only			0	79
American holly	Ilex opaca	NSL	Medium	0.4	0.2	0.1	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good			2	80
pawpaw	Asimina triloba	NSL	Low	0.5	0.2	0.4	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	81
ashe juniper	Juniperus ashei	NDH	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			0	82
red spruce	Picea rubens	NDH	High	0	0	0	Unknown	Unknown	Low	Absent	Unknown	Unknown			0	83
spruce pine	Pinus glabra	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	84
Table Mountain pine	Pinus pungens	NSL	Low	0	0	0	Unknown	New Habitat	High	Absent	Unknown	New Habitat		Migrate +	3	85
pitch pine	Pinus rigida	NSH	High	0	0	0	Unknown	New Habitat	Medium	Absent	Unknown	New Habitat		Likely +	3	86
striped maple	Acer pensylvanicum	NSL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	87
mountain maple	Acer spicatum	NSL	Low	0	0	0	Unknown	Unknown	High	Absent	Unknown	Unknown			0	88
Ohio buckeye	Aesculus glabra	NSL	Low	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	89
yellow birch	Betula alleghaniensis	NDL	High	0	0	0	Unknown	Unknown	Medium	Absent	Unknown	Unknown			0	90
cittamwood/gum bumelia	Sideroxylon lanuginosum ssp.	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat		Migrate ++	3	91
water hickory	Carya aquatica	NSL	Medium	0	0	0	Unknown	Unknown	Medium	Modeled	Unknown	Unknown			0	92
black hickory	Carya texana	NDL	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate ++	3	93
black ash	Fraxinus nigra	WSH	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat			3	94



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Common Name	Scientific Name	Range	MR	%Cell	FIAsum	FIAiv	ChngCl45	ChngCl85	Adap	Abund	Capabil45	Capabil85	SHIFT45	SHIFT85	SSO	N
blue ash	Fraxinus quadrangulata	NSL	Low	0	0	0	Unknown	Unknown	Low	Absent	Unknown	Unknown			0	95
silverbell	Halesia spp.	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	96
Osage-orange	Maclura pomifera	NDH	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat		Migrate +	3	97
southern magnolia	Magnolia grandiflora	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	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	Migrate ++	Migrate ++	3	99
bluejack oak	Quercus incana	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +	3	100
cedar elm	Ulmus crassifolia	NDH	Medium	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat		Migrate ++	3	101