S42 E90

One x One Degree
Climate Change Atlas Tree Species
Current and Potential Future Habitat, Capability, and Migration

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Iverson, Peters, Prasad, Matthews

	sq. km	sq. mi	FIA Plots
Area of Region	9,130.7	3,525.4	111

Species Information

The columns below provide breif 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
Ash	3
Hickory	2
Maple	4
Oak	7
Pine	2
Other	20
	38

Abundance	
Abundant	1
Common	20
Rare	17
Absent	16
	54

	Model Reliability	Adaptability
High	9	19
Medium	21	29
Low	24	7
FIA	3	
	57	**55**

Potential Change in Habitat Suitability	Scenario RCP45	Scenario RCP85
Increase	14	15
No Change	8	6
Decrease	13	14
New	14	15
Unknown	8	7
	57	**57**

Capability to Cope or Persist	Scenario RCP45	Scenario RCP85
Very Good	7	7
Good	9	10
Fair	5	5
Poor	7	6
Very Poor	6	3
FIA Only	1	1
Unknown	5	4
	40	**36**

Migration Potential	SHIFT RCP45	SHIFT RCP85
Likely	1	1
Infill	15	16
Migrate	6	12
	22	**29**

Potential Changes in Climate Variables

Temperature (°F)

	Scenario	2009	2039	2069	2099
Annual Average	CCSM45	47.2	49.3	52.0	52.2
	CCSM85	47.2	50.0	52.7	55.9
	GFDL45	47.2	52.3	52.7	53.9
	GFDL85	47.2	50.4	53.8	58.4
	HAD45	47.2	50.1	53.8	55.6
	HAD85	47.2	50.6	55.3	60.3
Growing Season May—Sep	CCSM45	66.3	68.6	70.9	71.3
	CCSM85	66.3	69.5	71.9	75.7
	GFDL45	66.3	72.6	72.8	74.8
	GFDL85	66.3	70.3	74.2	79.7
	HAD45	66.3	69.3	72.2	74.3
	HAD85	66.3	69.6	74.7	79.6
Coldest Month Average	CCSM45	16.3	18.4	21.0	21.1
	CCSM85	16.3	19.1	21.0	23.1
	GFDL45	16.3	19.9	21.2	21.6
	GFDL85	16.3	20.0	21.6	23.5
	HAD45	16.3	17.5	21.7	21.6
	HAD85	16.3	20.8	24.3	27.3
Warmest Month Average	CCSM45	72.5	75.0	76.5	77.1
	CCSM85	72.5	76.5	78.3	80.2
	GFDL45	72.5	75.8	77.4	79.0
	GFDL85	72.5	77.0	78.8	82.5
	HAD45	72.5	75.7	77.7	78.8
	HAD85	72.5	76.9	80.0	83.3

Precipitation (in)

	Scenario	2009	2039	2069	2099
Annual Total	CCSM45	35.8	35.2	35.3	35.5
	CCSM85	35.8	35.0	35.4	35.7
	GFDL45	35.8	38.5	42.5	41.4
	GFDL85	35.8	39.7	43.3	43.0
	HAD45	35.8	38.1	38.8	38.8
	HAD85	35.8	37.8	36.3	39.1
Growing Season May—Sep	CCSM45	20.8	20.6	20.4	20.6
	CCSM85	20.8	19.7	19.8	19.2
	GFDL45	20.8	21.6	24.0	22.9
	GFDL85	20.8	22.7	23.6	22.5
	HAD45	20.8	21.2	20.0	20.6
	HAD85	20.8	20.7	17.9	18.3

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
bur oak	Quercus macrocarpa	NDH	Medium	43	521.3	20.1	Sm. dec.	Sm. dec.	High	Abundant	Good	Good	Infill ++	Infill ++	1	1
black walnut	Juglans nigra	WDH	Low	59.7	491.0	12.6	No change	Sm. dec.	Medium	Common	Fair	Poor			1	2
American elm	Ulmus americana	WDH	Medium	79	467.6	10.6	No change	No change	Medium	Common	Fair	Fair			1	3
boxelder	Acer negundo	WSH	Low	62.3	429.0	11.5	Sm. dec.	Sm. dec.	High	Common	Fair	Fair			1	4
black cherry	Prunus serotina	WDL	Medium	63.6	315.6	7.6	Sm. dec.	Sm. dec.	Low	Common	Poor	Poor			0	5
American basswood	Tilia americana	WSL	Medium	46.8	307.7	10.8	Sm. dec.	Lg. dec.	Medium	Common	Poor	Poor			0	6
white oak	Quercus alba	WDH	Medium	34	284.4	10.1	Sm. inc.	No change	High	Common	Very Good	Good	Infill ++	Infill ++	1	7
sugar maple	Acer saccharum	WDH	High	32.1	236.6	10.5	No change	No change	High	Common	Good	Good	Infill ++	Infill ++	1	8
eastern redcedar	Juniperus virginiana	WDH	Medium	28.8	204.1	14.1	Sm. inc.	Lg. inc.	Medium	Common	Good	Very Good	Infill ++	Infill ++	1	9
slippery elm	Ulmus rubra	WSL	Low	62	199.1	5.0	No change	No change	Medium	Common	Fair	Fair			1	10
northern red oak	Quercus rubra	WDH	Medium	27.6	148.4	5.9	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good	Infill ++	Infill ++	1	11
bitternut hickory	Carya cordiformis	WSL	Low	37	142.5	4.9	No change	No change	High	Common	Good	Good			1	12
hackberry	Celtis occidentalis	WDH	Medium	42	135.8	6.0	Lg. inc.	Lg. inc.	High	Common	Very Good	Very Good	Infill ++	Infill ++	1	13
shagbark hickory	Carya ovata	WSL	Medium	28.4	102.3	5.4	Sm. inc.	Sm. inc.	Medium	Common	Good	Good	Infill ++	Infill ++	1	14
silver maple	Acer saccharinum	NSH	Low	14.9	99.9	9.9	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good	Infill ++	Infill ++	1	15
eastern hophornbeam; ironw	Ostrya virginiana	WSL	Low	26.6	86.9	3.9	Sm. inc.	Sm. inc.	High	Common	Very Good	Very Good			1	16
white ash	Fraxinus americana	WDL	Medium	41.4	82.9	4.1	Sm. inc.	Lg. inc.	Low	Common	Fair	Good			1	17
bigtooth aspen	Populus grandidentata	NSL	Medium	2.2	76.5	15.1	Lg. dec.	Lg. dec.	Medium	Common	Poor	Poor			0	18
red mulberry	Morus rubra	NSL	Low	18	68.7	6.1	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good			1	19
eastern white pine	Pinus strobus	WDH	High	11.4	55.0	13.3	Lg. dec.	Lg. dec.	Low	Common	Very Poor	Very Poor			0	20
green ash	Fraxinus pennsylvanica	WSH	Low	16.7	53.9	5.6	Lg. inc.	Lg. inc.	Medium	Common	Very Good	Very Good	Infill ++	Infill ++	1	21
northern pin oak	Quercus ellipsoidalis	NSH	Medium	5.9	45.0	14.1	Lg. dec.	Very Lg. dec.	High	Rare	Poor	Lost			0	22
chinkapin oak	Quercus muehlenbergii	NSL	Medium	4.3	43.3	4.3	No change	No change	Medium	Rare	Poor	Poor	Infill +	Infill +	2	23
black oak	Quercus velutina	WDH	High	20.6	43.1	3.0	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	1	24
quaking aspen	Populus tremuloides	WDH	High	10.1	42.3	4.9	Lg. dec.	Lg. dec.	Medium	Rare	Very Poor	Very Poor			0	25
black maple	Acer nigrum	NSH	Low	12.4	29.2	11.9	Lg. dec.	Lg. dec.	High	Rare	Poor	Poor			0	26
white mulberry	Morus alba	NSL	FIA	17.6	28.7	5.0	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	27
black ash	Fraxinus nigra	WSH	Medium	19.7	25.7	3.0	Lg. dec.	Very Lg. dec.	Low	Rare	Very Poor	Lost			0	28
paper birch	Betula papyrifera	WDH	High	1.6	20.3	3.0	Very Lg. dec.	Very Lg. dec.	Medium	Rare	Lost	Lost			0	29
Siberian elm	Ulmus pumila	NDH	FIA	5.5	17.7	8.5	Unknown	Unknown	NA	Rare	NNIS	NNIS			0	30
honeylocust	Gleditsia triacanthos	NSH	Low	8.8	12.3	3.9	Lg. inc.	Lg. inc.	High	Rare	Good	Good	Infill ++	Infill ++	2	31
black locust	Robinia pseudoacacia	NDH	Low	3.8	11.5	4.2	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	2	32
eastern cottonwood	Populus deltoides	NSH	Low	4.8	8.2	6.6	Lg. inc.	Lg. inc.	Medium	Rare	Good	Good	Infill ++	Infill ++	2	33
red pine	Pinus resinosa	NSH	Medium	7	6.1	3.9	Lg. dec.	Lg. dec.	Low	Rare	Very Poor	Very Poor			0	34
swamp white oak	Quercus bicolor	NSL	Low	1.1	5.3	1.0	No change	Sm. inc.	Medium	Rare	Poor	Fair	Infill +	Infill +	2	35
black willow	Salix nigra	NSH	Low	0.4	1.6	0.6	No change	Lg. inc.	Low	Rare	Very Poor	Fair		Infill +	2	36
American hornbeam; muscle	Carpinus caroliniana	WSL	Low	0.6	1.5	0.8	Sm. dec.	Very Lg. dec.	Medium	Rare	Very Poor	Lost			0	37
northern catalpa	Catalpa speciosa	NSHX	FIA	2.2	0.6	1.1	Unknown	Unknown	Medium	Rare	FIA Only	FIA Only			0	38
red maple	Acer rubrum	WDH	High	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Likely +	Likely +	3	39
mountain maple	Acer spicatum	NSL	Low	0	0	0	Unknown	Unknown	High	Absent	Unknown	Unknown			0	40
serviceberry	Amelanchier spp.	NSL	Low	0	0	0	Unknown	Unknown	Medium	Modeled	Unknown	Unknown			0	41
pawpaw	Asimina triloba	NSL	Low	0	0	0	Unknown	Unknown	Medium	Modeled	Unknown	Unknown			0	42
pignut hickory	Carya glabra	WDL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +	3	43
pecan	Carya illinoinensis	NSH	Low	0	0	0	New Habitat	New Habitat	Low	Absent	New Habitat	New Habitat		Migrate ++	3	44
black hickory	Carya texana	NDL	High	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +	3	45
mockernut hickory	Carya alba	WDL	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	46
sugarberry	Celtis laevigata	NDH	Medium	0	0	0	Unknown	New Habitat	Medium	Absent	Unknown	New Habitat			3	47

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eastern redbud	Cercis canadensis	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	48
flowering dogwood	Cornus florida	WDL	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat			3	49
common persimmon	Diospyros virginiana	NSL	Low	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat		Migrate +	3	50
yellow-poplar	Liriodendron tulipifera	WDH	High	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat		Migrate +	3	51
Osage-orange	Maclura pomifera	NDH	Medium	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +	Migrate ++	3	52
sycamore	Platanus occidentalis	NSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	53
pin cherry	Prunus pensylvanica	NSL	Low	0	0	0	Unknown	Unknown	Medium	Modeled	Unknown	Unknown			0	54
shingle oak	Quercus imbricaria	NDH	Medium	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat	Migrate +	Migrate +	3	55
post oak	Quercus stellata	WDH	High	0	0	0	New Habitat	New Habitat	High	Absent	New Habitat	New Habitat	Migrate +	Migrate ++	3	56
sassafras	Sassafras albidum	WSL	Low	0	0	0	New Habitat	New Habitat	Medium	Absent	New Habitat	New Habitat		Migrate +	3	57